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A COMPARATIVE STUDY OF VERBAL INTERACTION IN  
CONVENTIONAL AND TEAM TEACHING CLASSROOMS

by



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A THESIS

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "A Comparative Study of Verbal Interaction in Conventional and Team Teaching Classrooms" submitted by Murray Ellison in partial fulfillment of the requirements for the degree of Master of Education.



## ABSTRACT

This study investigated the differences in verbal interaction between conventional and team teaching classrooms. As adjuncts to the investigation, the relationships between verbal interaction and characteristics of teachers, grade, subject, group size, and type of instructional organization were also examined.

Verbal interaction in Division II classrooms in Edmonton, Alberta, was observed, categorized, and recorded according to the Flanders system of interaction analysis. One school of each of the two types of instructional organization comprised the sample; the schools were matched as closely as possible for their age, socio-economic area served, and size.

Records of classroom observations were converted into matrices. Individual cells, column totals, and several combinations of the matrices were used in analysing the data. For the most part, relationships were found between the various aspects of verbal interaction and the variables studied. Significant differences were found among the groups into which the data were classified for the entire sample and for both the medium groups and Social Studies segments of the sample. On the other hand, the observations of small groups and of Mathematics most frequently supported the null hypothesis. In general, age,





sex, education and experience of teachers, grade, subject, group size being taught, and type of instructional organization were related to the five criteria of verbal interaction.

A secondary analysis identified four of the thirteen categories of verbal interaction as accounting for the greatest variance among the groups. Differences were found between the team teaching and conventional classrooms in category 1 (teacher presents information or opinion) and category 13 ("other activities"). Large groups accounted for a much higher proportion of category 1, a higher proportion of category 8 (pupil-initiated talk to the teacher), and a much lower proportion of category 10 (private talk between teacher and pupil) than did either medium or small groups.

Group size emerged as the variable which seemed to account for the greatest variance in the findings. Furthermore, the findings seemed to support various claims in the literature pertaining to team teaching, such as that more time is spent on instruction than in conventional classrooms and that there is a greater variety in size of instructional group in the team teaching type of instructional organization. From the findings it seemed reasonable to conclude that variety in verbal interaction is facilitated in team teaching classrooms.



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## CHAPTER I

### DEFINITION OF THE PROBLEM

The importance of evaluating the effects of innovations in education is generally acknowledged. As one of many recent educational innovations, team teaching is an area in which very little evaluation has been undertaken. This fact is referred to by Heathers who, in speaking critically about the research that has been done to date, writes:

The dissemination of team teaching is proceeding at a rapid pace even though the plans being employed are incompetely designed, have never been successfully implemented, and have not been properly evaluated (6, p. 306).

Heathers further criticizes previous evaluative studies which compare team teaching plans with conventional organizational plans. These studies, he claims, fail to take adequate account of situational variables that might have a bearing on outcome (6, p. 343). It would seem appropriate, therefore, to examine instructional practices under team teaching and conventional organizational plans in order to provide a comparison between the two systems.

One approach which might be expected to reveal whether significant differences exist between the two systems of instructional organization is to study verbal behavior between teachers and pupils in conventional and team teaching classrooms. Such an approach was used in the present study.



## The Problem

The problem of the study was to determine whether there are differences in verbal interaction between conventional and team teaching classrooms.

## Sub-problems

Several sub-problems were designed to investigate differences in verbal interaction within the conventional school, within the team teaching school, and between the conventional and team teaching schools. The sub-problems were concerned with the relationships between various aspects of verbal interaction and selected variables; the sub-problems were:

1. to determine whether a relationship exists between various aspects of verbal interaction and selected personal and professional characteristics of teachers;
2. to determine whether a relationship exists between various aspects of verbal interaction and the grade being taught;
3. to determine whether a relationship exists between various aspects of verbal interaction and the subject matter being taught;
4. to determine whether a relationship exists between various aspects of verbal interaction and the size of the group being taught; and
5. to determine whether a relationship exists between various aspects of verbal interaction and the type of instructional organization.

## Importance of the Problem

Verbal communication is an important aspect of the





classroom behavior of both teachers and pupils. In their relationships with each other in the classroom, teachers and pupils must communicate. The verbal interaction that occurs largely determines the classroom atmosphere and affects considerably the effectiveness of the learning situation.

Such findings are referred to by Flanders in reporting various generalizations which had been established by 1958. Among these are two which pertain to the patterns of teacher influence:

. . . there is a direct relationship between teacher influence that encourages student participation and constructive pupil attitudes toward the teacher, the school work, and the class activities.

. . . . .

. . . all teachers employ a combination of statements, some that restrict freedom of participation and others that expand it. Given an extended period of observation, a fairly stable proportion or balance of indirect and direct statements can be identified for each teacher. This ratio . . . is positively correlated with the class average on an attitude inventory (4, p. 206).

In a similar vein, Lindgren reports a study of the advantages of student participation that was undertaken by Bovard, who compared the use of leader-centered as opposed to group-centered methods in classroom groups. Bovard found that:

. . . there was more verbal interaction (discussion) among the members of group-centered units. Furthermore, members of the group-centered units developed a greater liking for one another and for the group than did members of the leader-centered units (7, p. 387).

Lindgren concludes that "Bovard's study would seem to





indicate that free discussion helps to produce some of the conditions that are basic to cohesiveness and high morale", both of which, he says, are "important factors in the development of a favorable climate for learning in the classroom" (7, p. 387).

Another examination of the relative merits of the lecture method (teacher-centered) as opposed to the group discussion method (group-centered) was undertaken by Stovall. He reviewed twenty-seven studies that compared the results obtained by the two methods.

In general, the studies seemed to indicate a slight advantage for the lecture method when it came to mastery of factual material, but discussion was superior as a means of stimulating critical thinking and of aiding students in the attainment of a deeper understanding of subject matter, as reflected in the ability to make applications of newly acquired knowledge, to interpret, and to draw inferences. Furthermore, discussion had a greater effect on students' attitudes and values, as well as on their subsequent behavior (7, p. 306).

Twelve other studies concerning "Teacher-Centered versus Learner-Centered Classes" are reviewed by Hare. Commenting on these studies, by such researchers as Thelen, Withall, Bovard, and Flanders, Hare states that:

. . . the task-centered, demanding teachers were found to elicit from students hostility, apathy, and other signs of withdrawal, whereas accepting student-supportive teachers decreased anxiety and produced greater interaction and positive feeling among members both in class and outside the classroom (5, p. 317).

Proponents of team teaching claim that this type of instructional organization provides more effectively than



does conventional classroom organization for opportunities to alter the style of instruction between teacher-centered and student-centered methods according to specific purposes. As Casey illustrates, "Teacher-centered instruction is given formally to large groups of students who listen, take notes and study the material presented" (3, p. 170). She contrasts this type with small group instruction which is student-centered, in the hope that students will become active rather than passive learners. To that end, according to Casey, the teacher seeks to:

. . . share interpretations, both professional and student, for deeper understanding and appreciation; . . . encourage active participation and leadership by all members; promote mutual listening skills on part of both teacher and student; support individual questioning; . . . (3, p. 173).

Brownell and Taylor also call attention to this aspect of team teaching. In itemizing some of the hypothetical advantages of team teaching as compared with conventional classroom organization, they list the fact that team organization enables the team to form instructional groups varying considerably in size and to alter the size and composition of these groups as frequently as required according to ability or achievement levels (2, p. 151).

Trump and Baynham, in pointing out that students need to learn the skills of effective discussion, further illustrate the need for instructional arrangements which are different from the conventional, as follows:

More opportunities are needed for them to examine together and exchange ideas on important issues





of the day or issues within a subject area. Such examination and exchange lead to critical thinking and stimulate further inquiry. They are often the first steps in the process of acquiring knowledge and then doing something with that knowledge.

Discussion in today's schools is too often limited to a few remarks between the teacher and one pupil. Really effective discussion of important content develops best in the small group of no more than 15 persons, a setting logistically difficult to achieve in today's schools (9, p. 6).

If today's schools are to be called upon to accommodate team teaching techniques and other innovations, there exist real and urgent implications for the field of educational administration. The effectiveness of instruction and the welfare of students are uppermost in the mind of the administrator. Related to these considerations are many matters of direct concern to the administrator, such as the adaptability of staff members, the recruitment of both professional and para-professional personnel, the education of new teachers, the design of new buildings, the feasibility of renovating existing buildings, and the explanation or justification of team teaching to the public. These implications for the administrator suggest the importance to the field of educational administration of research relating to team teaching, such as the present comparative study of verbal interaction.

### Definition of Terms

The following are definitions of selected terms as they are used in the study.



Group size. Group size refers to the size of the group which is being taught at the time of observation. Large groups are considered to be those which are larger in size than the number of pupils in conventional classrooms. Medium groups refers to typical, conventional class size--approximately thirty, and no fewer than sixteen pupils. Small groups are considered to be those which contain fewer than sixteen pupils.

Conventional school. This term refers to a school in which the instructional organization is of the graded, self-contained classroom type and in which each teacher is assigned primarily to a group of pupils at a particular grade level and in a particular classroom.

Conventional classroom. A conventional classroom is a classroom in a conventional school; that is, one in which an individual teacher is assigned to a group of pupils at a particular grade level and in a particular classroom.

Team teaching. The definition of team teaching used in this study is one provided by Shaplin, namely:

Team teaching is a type of instructional organization, involving teaching personnel and the students assigned to them, in which two or more teachers are given responsibility, working together, for all or a significant part of the instruction of the same group of students (8, p. 15).

Team teaching school. This term refers to a school specifically designed for instructional organization of the team teaching type, and in which the instructional organization operates in one open instructional area for the





majority of the time.

Team teaching classroom. A team teaching classroom is an open instructional area in which the instructional organization of the team teaching type operates for the majority of the time.

Verbal interaction. Verbal interaction is considered to be the spontaneous verbal communication between teachers and pupils in the classroom; following Flanders' suggestion, the act of one person's reading continuously from a book or report is not considered to be communication (4, p. 198). Also, following Berelson's description of interaction as including all direct communication, whether verbal or non-verbal (1, p. 326), where it is obvious that a particular non-verbal communication or gesture substitutes for a verbal response, communication is considered to occur. Although "private talk between teacher and pupil" and "teacher-to-teacher talk" also are categorized, teacher talk refers only to "teacher-initiated talk" and to "teacher response talk"; similarly, pupil talk refers only to "pupil-initiated talk" and to "pupil response talk".

Uninterrupted talk. This term refers to teacher talk which is not followed immediately by pupil talk and to pupil talk which is not followed immediately by teacher talk. Uninterrupted teacher talk is represented operationally by the 25 cells included in rows 1 to 5 of columns 1 to 5 of the interaction analysis matrix (infra, pp. 41-43); transition from one category to another occurs only among the five



categories of teacher talk. Uninterrupted pupil talk is represented by the 16 cells included in rows 6 to 9 of columns 6 to 9; transition from one category to another occurs only among the four categories of pupil talk.

Total talk. This term refers to total teacher talk, which is represented by the category totals of columns 1 to 5 of the matrix, and to total pupil talk, which is represented by the category totals of columns 6 to 9.

Category totals. This term refers to the sums, by category, of all tallies in the matrix.

Steady state cells. This term refers to the number of tallies in each of the 13 diagonal cells of the matrix: 1-1, 2-2, . . . , 13-13. These cells represent consecutive occurrences of each particular category of interaction.

Group matrices. A group matrix is obtained by summing, cell by cell, two or more matrices of a particular classification. In the statistical analysis, comparisons were made between two or more matrices, for example, between the group matrix of the conventional school and that of the team teaching school. In the tables, the results of these comparisons are referred to as group matrices.

### Assumptions

The presence of observers did not affect substantially the behavior of the teachers and pupils observed.

The verbal interaction which was observed is representative of all verbal behavior which occurs during instructional periods in the classrooms selected for the study.



### Limitations

One limitation of the study is related to the size of the sample and the duration of the observational period. Since only one school of each type was included in the study, it is not meaningful to generalize about verbal interaction in other conventional and team teaching schools.

It was not the intent of the study to interpret or analyze all of the behavior observed, but rather to explore within the limitations described the differences in verbal interaction within and between the two schools of different types.

### Delimitations

Two schools in the Edmonton area were chosen in order to facilitate data collection.

The observations covered verbal interaction which occurred during the teaching of three school subjects only, namely, Reading, Mathematics, and Social Studies.

Observations were made only on typical school days; no observations were made on days either preceding or during a series of examinations, or on days when the regular teacher was absent.

### Organization of the Thesis

In the first chapter, the problem was defined and its relevance to the study of educational innovation and instructional organization was outlined. In Chapter II, the literature and research related to the problem is reviewed and the





hypotheses are developed. Chapter III deals with the instrumentation, the observational procedure, the description of the sample, and the nature of the data and its analysis. The findings are reported and discussed in Chapter IV. Finally, Chapter V presents the summary, conclusions, and implications of the study.





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## CHAPTER II

### RELATED LITERATURE

This chapter reviews the literature which is related to the five sub-problems of the study which are concerned with the relationship between verbal interaction and each of personal and professional characteristics of teachers, grade, subject matter, group size, and instructional organization. The hypotheses relevant to these sub-problems are stated at the end of each section and are repeated at the end of the chapter.

#### Characteristics of Teachers

As was mentioned earlier, the aspect of communication which was the focus of the present study is verbal interaction in the classroom. This approach is one which has been common to many studies in the field of interaction analysis. It is based upon the assumption that verbal behavior is an adequate sample of an individual's total behavior (1, p. 121; 18, p. 347). Flanders further explains this assumption by asserting that the process of interaction analysis becomes:

. . . a measure of teacher influence because it makes the assumption that most teacher influence is expressed through verbal statements and that most non-verbal influence is positively correlated with the verbal. Those who have worked with this technique are disposed to accept this assumption (8, p. 198).





Interaction analysis, according to Flanders, is still in a primitive stage of development. Nevertheless, the literature does identify several variables that have been found to affect verbal interaction; among these are teaching styles, teacher influence, and teacher competence. The significance of these factors as they affect not only patterns of verbal interaction, but also pupil attitudes, achievement, independence, and discipline is reported by Amidon and Flanders (1, p. 121), Amidon and Giammatteo (2, pp. 187-188), Flanders (8, pp. 202-219), and Hough (10, p. 384).

However, the correlates of verbal interaction mentioned above were not ones investigated in the present study. Rather, the study dealt with certain characteristics that may be predictive of teacher behavior in general and, in view of the assumption that "teacher influence is expressed through verbal statements" (supra, p. 13), may also be predictive of verbal interaction in the classroom.

An examination of Ryans's list of variables which influence classroom behavior reveals several that seem to be associated closely with verbal interaction (e.g., "favorable vs. unfavorable opinions of pupils", "favorable vs. unfavorable opinions regarding democratic classroom procedures", and "learning-centered, traditional vs. permissive, child-centered educational viewpoints"). These, together with two more general ones ("understanding, friendly vs. aloof, ego-centric, restricted teacher behavior", and "stimulating, imaginative, surgent vs. dull, routine teacher behavior")





were found to have varying relationships with personal and professional characteristics of teachers, such as age, sex, education, and experience (13, pp. 124-133, 285-342).

Although Ryans's findings do not suggest clear relationships between these variables and patterns of verbal interaction, they do seem to support the following general hypothesis:

Hypothesis 1: There is a significant relationship between various aspects of verbal interaction and certain personal and professional characteristics of the teacher.

The sub-hypotheses pertaining to the variables examined in the present study are as follows:

Hypothesis 1.1: There is a significant relationship between various aspects of verbal interaction and the age of the teacher.

Hypothesis 1.2: There is a significant relationship between various aspects of verbal interaction and the sex of the teacher.

Hypothesis 1.3: There is a significant relationship between various aspects of verbal interaction and the education of the teacher.

Hypothesis 1.4: There is a significant relationship between various aspects of verbal interaction and the experience of the teacher.

### Grade and Subject Matter

Very little literature is available which deals with verbal interaction in elementary school classrooms and only some of this literature provides information as to differences in interaction patterns that occur among the various grades and subject areas. However, one notable study is reported which identifies certain differences that occur



among the grades and among the subjects of Reading, Social Studies, and Arithmetic--the three subjects with which the present study was concerned.

Some of the findings which are reported by Furst and Amidon are:

PERCENTAGE OF TEACHER TALK. . . . in third, fourth, and fifth grades, teachers talk more in arithmetic. In sixth grade, teacher talk is highest in social studies.

PERCENTAGE OF STUDENT TALK. . . . in third, fourth, and fifth grades it is highest in social studies and lowest in arithmetic. In sixth grade students talk most in reading and least in arithmetic.

PERCENTAGE IN INDIVIDUAL CATEGORIES. Teachers in all elementary grades use more praise in social studies than in other subjects. . . .

. . . The fourth-grade teacher questions more in arithmetic and social studies than in reading, the fifth-grade teacher questions more in arithmetic and reading than in social studies, and the sixth-grade teacher questions more in social studies than in the other two areas.

. . . The amount of lecture in fifth and sixth grades is approximately the same for all subject areas (9, pp. 170-171).

No mention is made in this report of the significance of any of the differences which were revealed. However, the great number of differences noted, together with common knowledge about the different approaches to teaching that may be applied in the various grades and subject areas suggested that significant differences in verbal interaction might be revealed in the present study. These differences suggest the following hypotheses:

Hypothesis 2: There is a significant relationship between





various aspects of verbal interaction and the grade being taught.

Hypothesis 3: There is a significant relationship between various aspects of verbal interaction and the subject matter being taught.

### Group Size and Instructional Organization

The definition of team teaching that is used in this study does not contain a reference to the objectives of team teaching. Such a reference is omitted intentionally by Shaplin although he does point out a very general aim of team teaching, which is to improve instruction (14, p. 15).

Davis mentions that "there are almost as many variations of team teaching as there are teams" (7, p. 11). Team teaching is a phenomenon which lends itself not only to a variety of definitions but also to the inclusion of various other criteria and characteristics not mentioned directly in Shaplin's definition. For example, Singer adds the possibility of a team's including one or more teacher aides and the fact that this arrangement enables the team to take advantage of the special competencies of the members (15, p. 16); and Ohm focuses his definition on the decision-making responsibility of the team members "for a set of instructional variables such as time, group size, teacher assignment, and resource allocation" (6, p. 32).

In addition to such broad definitions as are cited above, the size and composition of instructional groups are aspects of team teaching procedures which receive particular mention in the literature. Shaplin, for example, refers to



groupings for "independent study, small-group instruction, large-group instruction, and diversified groupings by ability, achievement, and interest" as being useful teaching arrangements (14, p. 12).

Trump also calls attention to types and functions of various groups as he cites many areas of staff utilization that require additional study. Several of these areas are associated closely with interaction among teachers and pupils. For example, he suggests examinations of change in class size according to instructional purposes and methods, of selection of instructional methods and materials best suited to groups of widely varying sizes, and of provision for "flexibility in schedule arrangements to facilitate different sized classes at appropriate times" (16, pp. 286-290).

Team teaching apparently does permit the instructional group to arrange pupils for study and instruction as referred to by Shaplin. In reporting his observations after a concentrated tour of team teaching schools in the United States, Lovell reports the following as being one of the purposes attributed to team teaching by principals and other staff members whom he encountered:

. . . team teaching facilitates the building of a timetable which gives pupils more opportunities to follow their own interests, engage in small group discussions and independent study, and generally assume greater responsibility for their own direction and progress (12, p. 9).

In addition to Lovell's report of his observations, proponents and practitioners of team teaching claim various





other advantages for this type of instructional organization. For example, Wills mentions the following:

Team teaching facilitates grouping. In the self-contained classroom it is often not practical to group for instruction other than reading.

Pupils spend more time having instruction than when they are in a self-contained classroom. The more grouping done in a self-contained classroom, the more time each pupil must spend doing routine "seatwork". In team teaching, while one teacher is busy with one group, the other teachers can work with the rest of the students (17, pp. 160-161).

A team teaching type of instructional organization imposes upon both educational personnel and students demands that are quite different from those imposed by the conventional type of instructional organization. Teachers and pupils alike must learn new techniques of interpersonal behavior for, as Brownell and Taylor point out, ". . . a team pushes its teachers to an era of variety of instruction" (5, p. 154). Furthermore, as Beggs suggests, "While the general improvement of instruction is the broad goal, this is achieved primarily by the effects team teaching has on students and teachers" (4, p. 47). A further illustration of this point is provided by Cunningham as follows:

The instructional team requires increased communication among professional people, as well as students, in the planning, performance, and evaluation of teaching and learning (6, p. 32).

Outside the field of interaction analysis, Lindgren cites several studies which indicate the benefits that accrue from accessibility of group members to communication. Among these are works by Heise and Miller and by Blue.



Heise and Miller conducted experiments with various combinations and conditions in small groups. These experiments indicated that:

. . . the more accessible group members were to communication, the more effective groups were in solving the problems that had been assigned to them (11, p. 312).

Blue "compared the achievement of students studying in groups with that of students studying alone and found group study to be more effective" (11, p. 312).

On the other hand, Lindgren also summarizes the effects of teacher domination as follows:

. . . when teachers dominate and control the learning situation more than is necessary, there is a tendency for students to become apathetic, to lose interest in learning, and to do only what is required of them. . . . When the learning situation is teacher-dominated and teacher-oriented, most students do learn how to conform, obey, and follow directions, but they are less likely to learn how to apply classroom skills to the problems of daily life they encounter outside the classroom or will meet as adults. Teacher-dominated learning also tends to stifle creativity and spontaneity and acts to prevent the development of behavior that is self-directive--that is, behavior related to the making of decisions by and for oneself, an important kind of behavior for responsible citizens (11, pp. 307-308).

Whether or not any particular pattern of teacher influence or behavior is more desirable than others must be left, temporarily at least, to individual conjecture. Flanders does indicate that further research is required in this area, for example "toward a more objective description of teaching behavior" and toward describing the balance between "initiating" and "responding" by both teachers and





pupils (3, pp. viii-ix). Furthermore, he expresses his hope that persons will feel free to experiment with his basic categories of verbal interaction whenever they desire to make a distinction which is hidden by the broader categories (3, p. ix).

In view of the literature, there is reason to believe that the size of the group being taught might cause differences in patterns of verbal interaction, both in the conventional and the team teaching school. Also, the team teaching literature indicates that this form of instructional organization does provide opportunities for educational experiences and techniques that are different from those provided by the conventional form of instructional organization. Therefore, the available literature suggests the following hypotheses pertaining to the size of the group being taught and to the type of instructional organization:

Hypothesis 4: There is a significant relationship between various aspects of verbal interaction and the size of the group being taught.

Hypothesis 5: There is a significant relationship between various aspects of verbal interaction and the type of instructional organization.

### Summary and Statement of Hypotheses

This chapter has reviewed literature related to the five areas considered in the study, namely, personal and professional characteristics of teachers, grade, subject matter, group size, and type of instructional organization. Although the literature did not pertain specifically to the





association between personal and professional characteristics of teachers and verbal interaction, there was evidence to suggest that significant relationships would be found.

Differences in verbal interaction by grade and by subject matter being taught were found in one study reviewed; therefore, similar findings were expected in the present study.

Similarly, the size of the group being taught and the type of instructional organization are considered in the literature to influence behavior and the nature of educational experiences. Therefore, significant relationships were hypothesized between verbal interaction and both the size of the group being taught and the type of instructional organization.

The hypotheses are re-stated below:

- Hypothesis 1: There is a significant relationship between various aspects of verbal interaction and certain personal and professional characteristics of the teacher.
- Hypothesis 1.1: There is a significant relationship between various aspects of verbal interaction and the age of the teacher.
- Hypothesis 1.2: There is a significant relationship between various aspects of verbal interaction and the sex of the teacher.
- Hypothesis 1.3: There is a significant relationship between various aspects of verbal interaction and the education of the teacher.
- Hypothesis 1.4: There is a significant relationship between various aspects of verbal interaction and the experience of the teacher.
- Hypothesis 2: There is a significant relationship between various aspects of verbal interaction and the grade being taught.



- Hypothesis 3: There is a significant relationship between various aspects of verbal interaction and the subject matter being taught.
- Hypothesis 4: There is a significant relationship between various aspects of verbal interaction and the size of the group being taught.
- Hypothesis 5: There is a significant relationship between various aspects of verbal interaction and the type of instructional organization.



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## CHAPTER III

### METHODOLOGY

This chapter is devoted to a description of the sample, the instrumentation for observing and recording verbal interaction in the classrooms, observer training and reliability, and the methods employed for analyzing the data.

The sample is described with reference both to the personal and professional characteristics of the teachers included in the study and to certain information summarizing the nature and extent of the data, classified according to the various predictors being studied.

#### The Sample

The sample consisted of the teachers and their pupils in Division II of two elementary schools in Edmonton. One school was of the conventional, self-contained classroom type; the other was a school of the open area concept type, designed specifically to facilitate team teaching.

In order to control for some of the independent variables which might affect the verbal interaction, an attempt was made to have the two schools matched as closely as was feasible for their age, the socio-economic areas which they serve, and the student enrolment and number of staff members in Division II.





Information regarding the teachers' personal and professional characteristics were solicited by means of questionnaires which were distributed by one of the observers and were completed by the teachers. The questionnaire, a copy of which appears in Appendix A, included the following items:

- Age
- Sex
- Marital status
- University and professional education
- Teaching experience
- Administrative experience
- Teaching assignments

#### Description of the Sample

Division II in the conventional school consisted of eleven teachers and 10 classrooms. In the team teaching school it consisted of seven teachers and three grades; the number of pupils in each grade was approximately equal to the numbers included in any two classrooms of the conventional school. Among the teachers enumerated herein were the school principals, each of whom taught a subject at the Grade VI level.

Table I summarizes information regarding the age, sex, education, and experience of the teachers in each school. From this table it will be seen that the two schools differed perceptibly with respect to the average age of the teachers and the percentage of male teachers. However, they did not differ greatly with respect to the average education and average experience of the teachers.





TABLE I

PERSONAL AND PROFESSIONAL CHARACTERISTICS OF  
TEACHERS CLASSIFIED BY SCHOOL

Characteristic	School	
	Conventional	Team Teaching
Average Age (Years)	29.9	36.4
Average Education (Years)	4.2	4.1
Average Experience (Years)	7.1	7.6
% Male	45.5	57.1
Number of Teachers	11	7
% of All Teachers	61.1	38.9



Further descriptions of the sample are provided in two other tables.

Table II identifies teachers according to the personal characteristics of age and sex. In the analyses, age is divided into three classifications as follows:

Youngest	20-25 years
Medium age	26-34 years
Oldest	35-54 years

Division is made in this manner in order to provide approximately equal numbers of teachers in each age group for statistical analyses.

Some of the interesting features of this table are that the teachers in the medium age group had the greatest education, that there was an apparent relationship between age and the percentage of male teachers--the youngest group comprising the greatest proportion of males, and, as suggested by Table I, a greater percentage of the younger teachers than of the older teachers was found in the conventional school.

With respect to sex, the average age of the males was lower than that of females, the average education and average teaching experience of males were noticeably greater than were those of females, and, as also shown by Table I, the proportion of males was greater in the team teaching school than in the conventional.

Table III identifies teachers according to the professional characteristics of years of post-secondary education and of teaching experience. These characteristics are



TABLE II

PERSONAL AND PROFESSIONAL CHARACTERISTICS OF  
TEACHERS CLASSIFIED BY AGE AND BY SEX

Characteristic	Age			Sex	
	20-25	26-34	35-54	Male	Female
Average Age	-	-	-	32.4	33.6
Average Education	3.6	4.7	4.4	4.6	3.8
Average Experience	2.1	8.3	13.2	8.4	6.1
% Male	57.1	50.0	40.0	-	-
% in Conventional School	71.4	66.7	40.0	45.5	54.5
Number of Teachers	7	6	5	9	9
% of All Teachers	38.9	33.3	27.8	50.0	50.0





TABLE III

PERSONAL AND PROFESSIONAL CHARACTERISTICS OF  
TEACHERS CLASSIFIED BY EDUCATION  
AND BY EXPERIENCE

Characteristic	Education(Yrs.)			Experience(Yrs.)		
	2-3	4	5-6	1-2	3-7	8+
Average Age	28.0	28.8	37.4	25.7	29.0	42.7
Average Education	-	-	-	3.3	4.0	5.2
Average Experience	2.5	5	11.4	-	-	-
% Male	25.0	33.3	75.0	50.0	50.0	50.0
% in Conventional School	75.0	50.0	62.5	83.3	33.3	66.7
Number of Teachers	4	6	8	6	6	6
% of All Teachers	22.2	33.3	44.4	33.3	33.3	33.3



divided into three classifications each, as follows:

Least education	2-3 years
Medium education	4 years
Greatest education	5-6 years
Least experience	1-2 years
Medium experience	3-7 years
Greatest experience	8 or more years

This table reveals a fairly wide gap between both the average age and the average experience of teachers in the medium and greatest education groups. Not only does this table reinforce the fact shown in Table II that the average education of males is greater than is that of females, but also it reveals a rather striking trend, showing that the great majority of males have the greatest education and the great majority of females have the least education. This table also reveals that the conventional school is rather heavily weighted with the teachers in the least education and experience groups.

### Instrumentation

The technique which was used in the present study of verbal interaction is based upon the Flanders system of interaction analysis. This system involves a method of observation which is "used to quantify the qualitative aspects of verbal communication" by classifying the spontaneous communication in the classroom at a rate of approximately once every three seconds, together with a record of other details of classroom activity (6, pp. 197-198).

Since Flanders first used this system of analysis, other researchers have revised Flanders' categories and



adapted his techniques for various specific purposes (2, p. 20). A few of these related systems are the Verbal Interaction Category System, the Observational System for Instructional Analysis, and the 13-Category Modifications of Flanders' System of Interaction Analysis (2, pp. 141, 150, 348). Flanders encourages researchers to make such revisions and adaptations and states his belief, for example, "that the most efficient systems contain the fewest number of categories necessary to make the distinctions of interest to the researcher" (5, p. 371).

The Flanders and other related systems of observation are intended for use by an observer visiting a classroom by himself. Another system designed for use in this manner was employed by Medley and Mitzel. Their decision regarding this aspect of their technique is explained as follows:

A score based on observations made by two observers who see a teacher at different times is actually more reliable than one based on observations made by two observers who see the teacher at the same time; and it seems intuitively obvious that the former score is more valid as well, since the behavior sample obtained is twice as great (8, p. 86).

The categories selected for use in the present study are as follows:

Categories 1 to 3 -- Teacher-initiated talk

1. Presents information or opinion
2. Gives or discusses directions
3. Asks question

Categories 4 to 5 -- Teacher response talk

4. Accepts ideas, behavior, feeling of pupil
5. Rejects ideas, behavior, feeling of pupil

Categories 6 to 7 -- Pupil response talk

6. Responds to teacher





7. Responds to another pupil

Categories 8 to 9 -- Pupil-initiated talk

8. Initiates talk to teacher

9. Initiates talk to another pupil

Miscellaneous Categories

10. Private talk between teacher and pupil

11. Teacher-to-teacher talk

12. Silence or confusion

13. Other activities

Observed occurrences of these categories were recorded on a "Record of Observation" form. A sample of this form, completed for a typical five-minute observation, appears in Appendix C. Also recorded on the form were other descriptive details pertaining to each observation, as follows:

Date and time of observation

Teacher being observed

School

Grade

Subject being taught

Size of group for which teacher is responsible

Comments

Name of observer

### Procedure

The procedure of observation as established by Flanders is as follows:

The observer sits in the classroom in the best position to hear and see the participants. At the end of each three-second period, he decides which category best represents the communication events just completed. He writes this category number down while simultaneously assessing communication in the next period, and continues at a rate of 20 to 25 observations per minute, keeping his tempo as steady as possible. His notes are merely a sequence of numbers written in a column, top to bottom, so that the original sequence of events is preserved. . . . The observer also notes any



additional facts that seem pertinent to an adequate interpretation and recall of the total observation period (4, pp. 2-3).

Prior to undertaking observations in classrooms, the two observers underwent a training period for the purposes of becoming familiar with the procedure of observation and of establishing that the observations recorded were reliable. Video-tapes of both conventional and team teaching classes in session were used during this training period.

Following each training session, observer reliability was estimated using a method developed by Scott. This method is used by Flanders since it "is unaffected by low frequencies, can be adapted to percent figures, . . . and is more sensitive at higher levels of reliability" (4, p. 10).

Scott's coefficient, called "pi", can be described as "the amount by which the tallies of two observers exceeded chance agreement, divided by the amount by which perfect agreement exceeds chance" (7, p. 26). It is calculated by the formula:

$$Pi = \frac{Po - Pe}{1 - Pe}$$

In order to calculate Po and Pe, the percentage that the number of tallies for each category is of his total is first obtained for each observer. Po, the proportion of agreement, is determined by subtracting from 100 the percent disagreement between the two observers and summing over all categories. Pe, the proportion of agreement expected by chance, is determined by squaring the average percent for





the two observers, by category, dividing by 100, and summing over all categories.

Flanders claims that "A Scott coefficient of 0.85 or higher is a reasonable level of performance" (4, p. 15).

On the first day of the training period, the Scott coefficient for the two observers reached 0.795. By the fourth and last day, it ranged from 0.836 to 0.876.

In addition, in order to ensure adequate reliability throughout the period of data collection in the schools, both observers observed the same lesson on six occasions, using a different teacher each time. The Scott coefficients for these observations were 0.846, 0.845, 0.861, 0.849, 0.868, and 0.872.

The total times during which individual teachers were observed was approximately equal, with the exception of one teacher for whom as many observations were not possible. Furthermore, each teacher was observed for approximately the same length of time for each of the subjects that he taught. These constraints were applied, together with one which is advocated by Flanders. Since he claims that a matrix should have at least 400 tallies before an interpretation is attempted (3, p. 289), each teacher was observed for a minimum of twenty minutes for each of the subjects taught.

Observations generally were of five minutes' duration. However, this period occasionally was shortened for various reasons, such as the ending of a lesson, the changing of the subject being taught, or another teacher's assuming respon-





sibility for the class.

An attempt was made to observe the teachers in turn on a predetermined cycle. However, frequently this was not possible, partly because of the constraints mentioned heretofore and partly because the teacher was not always engaged in teaching one of the three subjects under study when his turn in the cycle arrived. In such cases, the observer moved to another teacher, and the one missed was observed as soon as possible thereafter.

Since the focus of the study was on the verbal interaction between each teacher and his pupils, the category "other activities" was used only when the teacher was not involved in verbal interaction.

In addition to the recording of the thirteen categories and other information pertinent to the five-minute observation, descriptive information which was considered by the observer to be relevant also was recorded.

Among the rules which were incorporated into the procedure of observation are the following which are provided by Amidon and Flanders:

If more than one category occurs during the three-second interval, then all categories used in that interval are recorded; therefore, record each change in category. If no change occurs within three seconds, repeat that category number.

. . . . .

If a silence is longer than three seconds, it is recorded as a 10 (1, p. 128).

Amidon and Flanders also suggest that a 10 for "Silence" (12 in the present study) be entered as the first and



the last number for each five-minute observation. This number is chosen since it is convenient to assume that each record begins and ends with silence in preparing the matrices (1, p. 130). This procedure also was followed by the observers.

### Construction of Interaction Analysis Matrices

The events observed during each five-minute observation were recorded as a series, or chain, of numbers, 1 to 13, representing the categories of verbal interaction used in the study. Each chain of numbers was converted into a matrix according to sequence pairs, the first and second numbers comprising the first pair, the second and third numbers the second pair, and so on.

Each sequence pair constitutes a tally in a cell of a thirteen by thirteen matrix, the vertical axis of which represents the first category in each sequence pair and the horizontal axis of which represents the second category. By this means, each category recorded for each observation, with the exception of the first and last, is used in two sequence pairs, and the transition from one category to another is preserved in the matrix. The total number of tallies in the cells of the matrix is, therefore, one less than the series of numbers recorded during the particular observation.

The interaction analysis matrix for the "Record of Observation" which appears in Appendix C is given in Table IV.



TABLE IV

INTERACTION ANALYSIS MATRIX OF A TYPICAL FIVE-MINUTE OBSERVATION  
(Observation No. 130)

Category <sup>a</sup>	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
1	2	0	1	1	0	0	0	0	0	0	0	1	1	6
2	0	0	1	0	0	8	0	0	0	0	0	1	0	10
3	0	0	3	0	0	12	0	0	0	0	0	1	0	16
4	0	9	5	0	1	2	0	0	0	0	0	1	0	18
5	1	0	2	0	0	4	0	0	0	0	0	0	0	7
6	1	0	2	17	6	6	0	0	0	0	0	2	0	34
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	1	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0	2	0	0	2	0	0	0	1	0	3	0	9
13	1	1	0	0	0	0	0	0	0	0	0	0	11	13
Total	6	10	16	18	7	34	0	0	0	1	0	9	13	114

<sup>a</sup>See Appendix B for description of categories





In addition to the basic matrix for each five-minute observation, groups of the basic matrices were summed based upon classifications employed in the analyses, for example, by school, subject, and age of teacher. Examples of such group matrices appear in Tables V, VI, and VII. From these tables it will be seen that the matrices of cell frequencies for the conventional and team teaching schools are sums of the basic matrices of all observations in the respective schools. It will also be seen that the matrix of cell frequencies for the entire sample represents the sum of the group matrices for the individual schools.

#### Summary of the Data

A total of 221 five-minute observations was recorded --136 in the conventional school and 85 in the team teaching school. The proportion of observations in each school to the total was approximately equal to the ratio of Division II teachers in each of the two schools, 11 and 7 respectively, to the total number of teachers in the sample.

The time represented by the five-minute observations was approximately 18.3 hours. During this time, 24,659 interaction analysis tallies were obtained. Of these totals, observations of Reading comprised 6.0 hours, during which time 8135 tallies were obtained; those of Mathematics comprised 5.7 hours, during which time 7667 tallies were obtained; and those of Social Studies comprised 6.6 hours, during which time 8857 tallies were obtained.



TABLE V

## INTERACTION ANALYSIS MATRIX OF CELL FREQUENCIES FOR THE CONVENTIONAL SCHOOL

Category <sup>a</sup>	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
1	1625	66	247	8	9	29	1	144	6	15	0	49	43	2242
2	42	589	57	2	11	80	1	57	5	27	0	32	109	1012
3	39	20	275	5	10	800	0	21	0	6	0	73	8	1257
4	212	58	302	19	17	41	0	42	3	10	0	35	25	764
5	56	38	96	3	130	52	0	30	0	13	0	10	29	457
6	38	33	109	642	164	684	0	23	6	4	0	49	15	1767
7	5	3	2	2	1	0	28	1	6	0	0	1	7	56
8	102	32	25	74	54	15	2	239	3	407	0	10	18	981
9	6	1	2	0	1	1	19	6	52	2	0	2	9	101
10	29	46	18	1	22	1	1	240	4	2331	3	40	261	2997
11	1	0	0	0	0	0	0	1	0	0	8	1	1	12
12	52	35	78	1	10	53	1	30	3	27	0	101	48	439
13	35	91	46	7	28	11	3	147	13	155	1	36	2901	3474
Total	2242	1012	1257	764	457	1767	56	981	101	2997	12	439	3474	15559

<sup>a</sup>See Appendix B for description of categories



TABLE VI

## INTERACTION ANALYSIS MATRIX OF CELL FREQUENCIES FOR THE TEAM TEACHING SCHOOL

Category <sup>a</sup>	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
1	1904	75	205	4	9	9	0	85	3	6	2	33	16	2351
2	51	287	23	0	10	38	0	21	0	9	2	23	43	507
3	33	6	193	3	2	421	0	15	0	1	0	37	4	715
4	166	23	113	5	7	8	0	24	0	1	0	18	3	368
5	35	23	60	1	36	22	0	11	0	5	1	2	3	199
6	25	16	59	314	94	303	1	5	2	2	0	12	3	836
7	0	1	2	0	1	1	7	0	4	2	0	1	0	19
8	58	12	16	39	17	4	2	201	3	147	1	4	15	519
9	1	0	3	1	0	1	9	1	8	1	0	0	1	26
10	7	21	5	0	7	2	0	79	3	1648	1	21	132	1926
11	2	0	0	0	0	0	0	3	0	0	36	4	4	49
12	50	25	25	0	9	23	0	13	2	20	0	30	9	206
13	19	18	11	1	7	4	0	61	1	84	6	21	1146	1379
Total	2351	507	715	368	199	836	19	519	26	1926	49	206	1379	9100

<sup>a</sup>See Appendix B for description of categories





TABLE VII

INTERACTION ANALYSIS MATRIX OF CELL FREQUENCIES FOR THE ENTIRE SAMPLE

Category <sup>a</sup>	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
1	3529	141	452	12	18	38	1	229	9	21	2	82	59	4593
2	93	876	80	2	21	118	1	78	5	36	2	55	152	1519
3	72	26	468	8	12	1221	0	36	0	7	0	110	12	1972
4	378	81	415	24	24	49	0	66	3	11	0	53	28	1132
5	91	61	156	4	166	74	0	41	0	18	1	12	32	656
6	63	49	168	956	258	987	1	28	8	6	0	61	18	2603
7	5	4	4	2	2	1	35	1	10	2	0	2	7	75
8	160	44	41	113	71	19	4	440	6	554	1	14	33	1500
9	7	1	5	1	1	2	28	7	60	3	0	2	10	127
10	36	67	23	1	29	3	1	319	7	3979	4	61	393	4923
11	3	0	0	0	0	0	0	4	0	0	44	5	5	61
12	102	60	103	1	19	76	1	43	5	47	0	131	57	645
13	54	109	57	8	35	15	3	208	14	239	7	57	4047	4853
Total	4593	1519	1972	1132	656	2603	75	1500	127	4923	61	645	4853	24659

<sup>a</sup>See Appendix B for description of categories



When classified by group size, observations of large groups comprised 2.3 hours, those of medium groups comprised 13.7 hours, and those of small groups comprised 2.3 hours. When classified by grade, the total time represented by five-minute observations in Grade IV was 6.0 hours, in Grade V it was 4.8 hours, and in Grade VI it was 7.5 hours. When classified by school, observations in the conventional school comprised 11.5 hours and those in the team teaching school comprised 6.8 hours.

Of the 18.3 hours of recorded observation, verbal interaction involving the teacher accounted for 80.3% of class time--77.7% in the conventional school and 84.8% in the team teaching school. Included in this percentage is Private Talk between Teachers and Pupils and Teacher-to-Teacher Talk, which categories accounted for 20.0% and 0.2% of the time respectively.

The proportion of Private Talk between Teachers and Pupils was approximately equal for the two schools--19.3% for the conventional school and 21.2% for the team teaching school. However, although of minor frequency, the proportion of Teacher-to-Teacher Talk was much greater for the team teaching school than for the conventional. All but one teacher in the team teaching school engaged during one or more of the five-minute observations in Teacher-to-Teacher Talk, with 4 of the 7 teachers each accounting for 7 or more tallies in this category. In the conventional school, only 2 teachers were observed in this category, accounting for a



total of 12 tallies, as compared to 49 for the team teaching school.

Other summaries of the data appear in Appendices D, E, and F, in which are shown the "record of five-minute observations and total interaction analysis tallies" classified by teacher, "total interaction analysis tallies" classified by combinations of predictors, such as by school and grade and by school and subject, and the "interaction analysis category totals" classified by such predictors as age of the teacher and subject being taught.

### Statistical Analysis

The IBM 360/67 System was used to output the interaction analysis matrices and otherwise analyze the data. The computer programs calculated the following statistics:

A. Darwin Chi Square and Standard Score. These statistics were used to test the null hypothesis that the total interaction patterns of two or more matrices are the same. Darwin's chi square is calculated using the following formula:

$$X^2 = 2 (K - L - M + N)$$

Flanders describes the calculation of Darwin's chi square with reference to two 10 by 10 matrices (A and B) and a third matrix (C) which is the sum of matrices A and B (7, p. 32). Part of Flanders' description is as follows:

The first term, K, is found by multiplying each cell frequency by its own natural logarithm . . . , adding these 100 products from A to the 100 products from B, and the sum will then equal the first term K.





The second term L is found by multiplying each row total by its own natural logarithm, adding the 10 products from A to the 10 products from B, and the sum will then equal term L.

The third term M is found by multiplying each cell frequency in the C matrix by its own natural logarithm, adding the 100 products, and the total will then equal term M.

The fourth term N is found by multiplying each row total of matrix C by its own natural logarithm, adding the 10 products, and the total will then equal term N.

Since chi square approaches the normal distribution for higher degrees of freedom, the Darwin chi square is converted to a standard score, as follows:

$$Z = \frac{\chi^2}{2n - 1}$$

In this formula, n represents the degrees of freedom, which is calculated from the formula:

$$n = s(s - 1)(r - 1),$$

where s is the number of categories and r is the number of matrices being compared (12).

Z scores greater than 1.96 reveal differences that are significant at the 0.05 level of confidence; those that are greater than 2.58 reveal differences that are significant at the 0.01 level; and those that are greater than 3.29 reveal differences that are significant at the 0.001 level.

A Darwin chi square is calculated for the criterion of "group matrices", that is, for the comparison that is made between two or more group matrices.

B. Chi Square. The chi square statistic tests the null hypothesis that there are no significant differences



between the observed and expected distributions of frequencies for a given group where the expected frequencies assume no differences between or among groups.

A chi square probability is calculated to indicate the level at which the differences might have resulted simply from chance variation due to the particular sample selected from the population. For example, the null hypothesis is rejected at the 0.05 level of confidence when the chi square probability is less than 0.05.

This statistic is applied to the following criteria:

- (a) the distributions of the "category totals";
- (b) the distributions of the "steady state cells";
- (c) the distributions of "uninterrupted talk" of teachers and pupils; and
- (d) the distributions of "total talk" of teachers and pupils.

The primary analyses used in testing the hypotheses included observations for the entire sample. However, where there were sufficient numbers of teachers represented in the groups being compared to make additional analyses meaningful, such analyses were made. This was done in order to ascertain whether differences found for the entire sample also held for segments of the sample.

### Summary

This chapter includes a description of the sample, of the instrument used for observing and recording verbal interaction in the classrooms included in the study, of the



observational procedures employed, and of the method used for converting the raw data into the matrices used for the statistical analyses.

Reference was made in the chapter to such aspects of the data as the time represented by the classroom observations, the number of interaction analysis tallies represented by various classifications of the data, and various statistical summaries of the data which are included in the Appendices.

Finally, descriptions were given of the statistical procedure used in analyzing the data.





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## CHAPTER IV

### ANALYSIS OF THE DATA

The major purpose of the present study was to determine whether there are differences in verbal interaction between conventional and team teaching classrooms. In order to approach this problem, the relationship between various aspects of verbal interaction and certain selected variables was studied. Five hypotheses pertaining to these relationships were formulated in Chapter II.

In this chapter, these hypotheses are stated and the results of the tests which were described in the previous chapter are presented and discussed. Each hypothesis was tested on five criteria of verbal interaction, namely, group matrices, category totals, steady state cells, uninterrupted talk, and total talk. Examples of the basic data used for the analyses appear in Appendix G, Tables XLIII to XLVI.

In the tables in this chapter which report the results of the tests of the hypotheses, the levels of significance that are reported are 0.05, 0.01, and 0.001. In fact, many of the 0.001 figures that appear were significant well beyond that level to six decimal places.

In view of Flanders' statement regarding the





minimum number of tallies in a matrix before an interpretation is attempted (1, p. 289), matrices containing fewer than four hundred tallies were excluded from the analyses. Notations have been made wherever this practice was followed.

In addition to the statistical analyses described above, a secondary analysis was made to determine the particular categories of verbal interaction which seemed to account for the greatest variance. This secondary analysis consisted of comparisons of the proportions and ranks of interaction analysis category totals among the groups of observations when classified by age, by sex, by education, and by experience of teacher, by grade, by subject, by group size, and by school. The results of this secondary analysis are presented and discussed under each hypothesis.

Particular reference is made in the discussion to the categories for which the differences in ranking among the groups was two or more. Also mentioned are the categories for which there appears to be a great discrepancy in proportions among the groups, regardless of the differences in ranking. However, categories 7, 9, and 11 are not included in the discussion since it was not considered meaningful to do so in view of the very few interaction analysis tallies accounted for by these categories.

## I. CHARACTERISTICS OF TEACHERS

Hypothesis 1 states that there is a relationship





between various aspects of verbal interaction and certain personal and professional characteristics of the teacher. Four teacher characteristics were selected for testing this hypothesis, namely, age, sex, education, and experience. The results for each of these characteristics are presented separately below under sub-hypotheses 1.1 to 1.4.

Where differences were revealed by the analysis of observations for the entire sample, additional analyses were undertaken in an attempt to identify possible sources of these differences, providing there were sufficient numbers of teachers represented to make such analyses meaningful. Those analyses that did seem to be meaningful involved observations of medium groups classified by age, by education, and by experience of teacher, observations of each of large, medium, and small groups classified by sex of teacher, observations of Reading, of Mathematics, and of Social Studies classified by sex of teacher, and observations of the conventional school and of the team teaching school classified by sex of teacher.

#### Age of Teacher

Hypothesis 1.1: There is a significant relationship between various aspects of verbal interaction and the age of the teacher.

Findings. The analysis of observations for the entire sample classified by age of teacher revealed significant differences beyond the 0.001 level of confidence for each of the five criteria of verbal interaction, as is shown



in Table VIII. Similar results were obtained when the observations for medium groups (the only classification with enough observations to make additional analysis meaningful) were analysed separately, as seen in the same table. All differences in this analysis were significant at the 0.001 level of confidence.

The secondary analysis which attempted to determine which categories accounted for the greatest variance among the age groups revealed differences of two or more between ranks for categories 8, 1, and 10. The data for this analysis are reported in Table IX.

Category 8 (Pupil initiates talk to teacher), ranking seventh among the thirteen categories for the entire sample, ranked fifth for teachers in the medium age group and eighth for the youngest teachers. Category 1 (Teacher presents information or opinion), ranking third among all categories for the entire sample, ranked third for the youngest teachers and first for the oldest and medium age groups. The ranking for category 10 (Private talk between teacher and pupil), which ranked first among the thirteen categories for the entire sample, was highest, ranking first, for the youngest teachers and lowest, ranking third, for teachers in the medium age group.

Discussion. The research hypothesis was wholly supported by the findings. All differences tested were sufficient to reject the null hypothesis at, or beyond, the



TABLE VIII

ANALYSIS OF OBSERVATIONS FOR THE ENTIRE SAMPLE AND FOR  
MEDIUM GROUPS CLASSIFIED BY AGE OF TEACHER

Criterion	Entire Sample			Medium Groups		
	$\chi^2$	df	Signif- icance	$\chi^2$	df	Signif- icance
Group Matrices	660	312	0.001	619	312	0.001
Category Totals	699	24	0.001	750	24	0.001
Steady States	414	24	0.001	459	24	0.001
Uninterrupted Talk	11.5	2	0.01	29.7	2	0.001
Total Talk	8.8	2	0.05	18.9	2	0.001





TABLE IX

PROPORTIONS AND RANKS OF INTERACTION ANALYSIS CATEGORY  
TOTALS CLASSIFIED BY AGE OF TEACHER  
AND FOR THE ENTIRE SAMPLE

Cate- gory <sup>a</sup>	20-25 Years		26-34 Years		35-54 Years		Entire Sample	
	%	Rank	%	Rank	%	Rank	%	Rank
1	15.7	3	22.0	1	18.9	1	18.6	3
2	5.9	6	5.7	7	7.6	6	6.2	6
3	9.4	5	6.2	6	8.3	5	8.0	5
4	5.7	7	3.6	8	4.2	8	4.6	8
5	2.7	10	2.0	10	3.8	9	2.7	9
6	13.0	4	7.8	4	10.2	4	10.6	4
7	0.1	13	0.7	12	0.0	13	0.3	12
8	4.6	8	7.4	5	6.7	7	6.1	7
9	0.2	11.5	1.2	11	0.1	12	0.5	11
10	20.7	1	20.0	3	18.7	2	20.0	1
11	0.2	11.5	0.3	13	0.3	11	0.2	13
12	3.0	9	2.1	9	2.7	10	2.6	10
13	19.0	2	21.1	2	18.6	3	19.7	2

<sup>a</sup>See Appendix B for description of categories



0.05 level of confidence and, for most criteria, at the 0.001 level.

Unfortunately, the number of teachers in the sample precluded comparisons within each subject, and within large, medium, and small groups classified by age of teacher. Had this been feasible, it is quite possible that the null hypothesis would not have been rejected for all criteria of verbal interaction under study. Tentatively, therefore, it appears that age of the teacher can be regarded as a variable related to verbal interaction.

The comparison of category rankings for each age group revealed interesting findings. It appears that within the classrooms taught by the youngest teachers there was less time spent proportionately in categories 1 and 8 and more time proportionately in category 10 than within the classrooms taught by teachers in the other age groups. With the possible exception of category 10, there does not seem to be a consistent trend among the age groups with regard to any of these categories; nevertheless, it does seem reasonable to suggest the following: firstly, that the youngest teachers were more inclined toward "Private talk between teacher and pupil" (category 10) and less inclined toward presenting information or opinion (category 1) which was audible to, or perhaps was intended to be heard by, the entire class than were teachers in the other age groups; and secondly, that teachers in the average age



group were more receptive than were the others to pupil-initiated talk directed to the teacher (category 8).

### Sex of Teacher

Hypothesis 1.2: There is a significant relationship between various aspects of verbal interaction and the sex of the teacher.

Findings. The analysis of observations for the entire sample classified by sex of teacher revealed differences for each of the five criteria of verbal interaction, as is reported in Table X. In an attempt to identify possible sources of these differences, additional analyses were then undertaken. For the most part, the differences, found for the entire sample to be significant at the 0.001 level of confidence, held when differences between the sexes were examined within each school, within each of the subjects taught, and within each of the three classifications of class size.

The results for the conventional school were identical to those for the entire sample, while those for the team teaching school differed in level of significance for the uninterrupted talk criterion and indicated no significant difference between classrooms taught by males and those taught by females for the criterion of total talk.

Table XI shows that the differences between the sexes were significant for all criteria in the analyses of observations for Mathematics and for Social Studies, while the results for Reading revealed no significant differences





TABLE X

ANALYSIS OF OBSERVATIONS FOR THE ENTIRE SAMPLE, FOR THE CONVENTIONAL SCHOOL,  
AND FOR THE TEAM TEACHING SCHOOL CLASSIFIED BY SEX OF TEACHER

Criterion	Entire Sample			Conventional School			Team Teaching School		
	X <sup>2</sup>	df	Signif- icance	X <sup>2</sup>	df	Signif- icance	X <sup>2</sup>	df	Signif- icance
Group Matrices	438	156	0.001	417	156	0.001	287	156	0.001
Category Totals	475	12	0.001	465	12	0.001	193	12	0.001
Steady States	542	12	0.001	477	12	0.001	220	12	0.001
Uninterrupted Talk	197	1	0.001	228	1	0.001	7.6	1	0.01
Total Talk	89.8	1	0.001	99.5	1	0.001	2.5	1	N.S.



TABLE XI

ANALYSIS OF OBSERVATIONS FOR READING, FOR MATHEMATICS, AND FOR  
SOCIAL STUDIES CLASSIFIED BY SEX OF TEACHER

Criterion	Reading		Mathematics		Social Studies	
	$\chi^2$	df Signif- icance	$\chi^2$	df Signif- icance	$\chi^2$	df Signif- icance
Group Matrices	217	156 0.01	277	156 0.001	334	156 0.001
Category Totals	490	12 0.001	363	12 0.001	549	12 0.001
Steady States	359	12 0.001	229	12 0.001	507	12 0.001
Uninterrupted Talk	0.2	1 N.S.	8.7	1 0.01	137	1 0.001
Total Talk	1.2	1 N.S.	18.7	1 0.001	64.2	1 0.001



between males and females for uninterrupted talk and total talk, and a lower level of significance for the group matrices criterion.

Table XII reports the results of analyses of observations classified by sex of teacher for large, for medium, and for small groups. The results for medium groups did not differ from those for the entire sample, while the results for large groups showed no significant differences for uninterrupted talk and total talk and those for small groups showed no differences for the criterion group matrices.

The rank ordering of category totals which attempted to identify the categories accounting for the greatest variance between the sex groups showed that category 13 (Other activities), ranking second among the thirteen categories when both sexes were taken together, was much larger for females, for whom it ranked first than it was for males, for whom it ranked third. No other differences in category ranks were of the order being reported, that is, a difference in rank of two or more between the two sex groups. The data for this analysis are reported in Table XIII.

Discussion. The research hypothesis was wholly supported by the findings with respect to differences tested for the entire sample and for certain segments of the sample, namely, observations for the conventional school, for Mathematics, for Social Studies, and for medium





TABLE XII

ANALYSIS OF OBSERVATIONS FOR LARGE GROUPS, FOR MEDIUM GROUPS, AND FOR  
SMALL GROUPS CLASSIFIED BY SEX OF TEACHER

Criterion	Large Groups			Medium Groups			Small Groups		
	$\chi^2$	df	Signif- icance	$\chi^2$	df	Signif- icance	$\chi^2$	df	Signif- icance
Group Matrices	245	156	0.001	430	156	0.001	127	156	N.S.
Category Totals	241	12	0.001	488	12	0.001	198	12	0.001
Steady States	137	12	0.001	535	12	0.001	116	12	0.001
Uninterrupted Talk	2.6	1	N.S.	174	1	0.001	22.9	1	0.001
Total Talk	0.0	1	N.S.	70.3	1	0.001	13.0	1	0.001



TABLE XIII

PROPORTIONS AND RANKS OF INTERACTION ANALYSIS CATEGORY  
 TOTALS CLASSIFIED BY SEX OF TEACHER  
 AND FOR THE ENTIRE SAMPLE

Category <sup>a</sup>	Male		Female		Entire Sample	
	%	Rank	%	Rank	%	Rank
1	20.8	2	16.5	3	18.6	3
2	5.4	7	6.9	6	6.2	6
3	8.5	5	7.5	5	8.0	5
4	4.8	8	4.4	8	4.6	8
5	2.8	9	2.5	10	2.7	9
6	9.3	4	11.7	4	10.6	4
7	0.1	13	0.5	12	0.3	12
8	5.7	6	6.5	7	6.1	7
9	0.3	12	0.7	11	0.5	11
10	23.2	1	16.9	2	20.0	1
11	0.4	11	0.1	13	0.2	13
12	2.6	10	2.6	9	2.6	10
13	16.1	3	23.1	1	19.7	2

<sup>a</sup>See Appendix B for description of categories



groups. It was supported only partially for the observations for the team teaching school, for Reading, for large groups, and for small groups.

It appears from these findings that sex of the teacher can be regarded as a variable related to verbal interaction. However, it also appears to be significant that the consistently great differences noted for the entire sample and for certain segments of the sample did not hold throughout the analyses. In view of the apparent differences between schools, subjects, and the three sizes of instructional group, these findings suggest the possibility that school, subject, and group size are important variables related to verbal interaction. These variables may be more closely associated with verbal interaction than is sex of teacher.

The marked difference in the ranking of category 13 between males and females is extremely interesting, for the difference is even more noticeable in the proportions--16.1% and 23.1% respectively. A difference of approximately the same size is also noticed in the proportions for category 10, (Private talk between teacher and pupil), although the larger proportion in this case is for males. Male teachers spent 6.3% more classroom time than did females in "Private talk between teacher and pupil". Collectively, the two categories, 10 and 13, account for approximately 40% of the tallies, both for males and for females.





Although the tallies for category 13 do not pretend to describe the amount of time that pupils spend on seat-work, these figures do indicate the approximate amount of time that is spent by pupils on seatwork when the teacher is not at the same time engaged in verbal interaction with one or more pupils.

That male teachers talk markedly more than females is also seen by referring to all teacher talk categories, namely, categories 1 to 5. In all but one of these, category 2 (Gives or discusses directions), males exceeded females, especially on category 1 (Presents information or opinion).

Although no judgment is intended in this regard, it is of interest to relate these findings to the differences between the sexes in this sample that were presented earlier. In Table II, p. 30, it was seen that the average age of males was lower, and both the average education and average experience of males was greater than were those of females. From this it may be concluded that the teachers who talked most and spent least time on supervising seat-work tended to be male, to be younger, and to have greater average education and average experience.

### Education of Teacher

Hypothesis 1.3: There is a significant relationship between various aspects of verbal interaction and the education of the teacher.

Findings. The analysis of observations for the



entire sample and for medium groups classified by education of the teacher revealed significant differences for each of the five criteria of verbal interaction, as is shown in Table XIV. Without exception, these differences were significant at the 0.001 level of confidence.

The rank ordering of category totals (Table XV) reveals that the categories which seemed to account for the greatest variance among the education groups were category 8 (Pupil initiates talk to teacher), category 1 (Teacher presents information or opinion), category 2 (Teacher gives or discusses directions), and category 10 (Private talk between teacher and pupil).

Category 8 ranked highest, fifth, for teachers with the most education and ranked lowest, eighth, for those with the least education; category 1 ranked first for teachers with average education and ranked third for both other groups; category 2 ranked fifth for teachers with the least education and ranked seventh for teachers with the most education; and category 10 ranked highest, first, for those with the most education and ranked lowest, third, for those with average education. Also, category 13 (Other activities), although not reflected in differences in ranking, showed a marked difference in proportions between the education groups, the group with the least education having the highest proportion.

Discussion. The research hypothesis was wholly



TABLE XIV

ANALYSIS OF OBSERVATIONS FOR THE ENTIRE SAMPLE AND FOR  
MEDIUM GROUPS CLASSIFIED BY EDUCATION OF TEACHER

Criterion	Entire Sample			Medium Groups		
	$\chi^2$	df	Signif- icance	$\chi^2$	df	Signif- icance
Group Matrices	651	312	0.001	610	312	0.001
Category Totals	901	24	0.001	584	24	0.001
Steady States	817	24	0.001	460	24	0.001
Uninterrupted Talk	46.5	2	0.001	63.2	2	0.001
Total Talk	55.1	2	0.001	55.4	2	0.001





TABLE XV

PROPORTIONS AND RANKS OF INTERACTION ANALYSIS CATEGORY  
TOTALS CLASSIFIED BY EDUCATION OF TEACHER  
AND FOR THE ENTIRE SAMPLE

Category <sup>a</sup>	2-3 Years		4 Years		5-6 Years		Entire Sample	
	%	Rank	%	Rank	%	Rank	%	Rank
1	15.6	3	22.9	1	16.6	3	18.6	3
2	8.4	5	5.6	6	5.4	7	6.2	6
3	8.0	6	9.4	5	6.8	6	8.0	5
4	5.0	7	5.0	8	4.0	8	4.6	8
5	2.7	9	2.7	9	2.6	9.5	2.7	9
6	11.5	4	11.8	4	8.9	4	10.6	4
7	0.0	13	0.1	12.5	0.6	12	0.3	12
8	4.7	8	5.2	7	7.6	5	6.1	7
9	0.1	11.5	0.2	11	1.0	11	0.5	11
10	17.7	2	14.6	3	25.8	1	20.0	1
11	0.1	11.5	0.1	12.5	0.4	13	0.2	13
12	2.6	10	2.6	10	2.6	9.5	2.6	10
13	23.6	1	19.7	2	17.5	2	19.7	2

<sup>a</sup>See Appendix B for description of categories



supported by the findings, since all differences tested were sufficient to reject the null hypothesis at the 0.001 level of confidence. However, as was the case for age of the teacher, Hypothesis 1.1, it was not feasible, due to the limited size of the sample, to undertake additional analyses for other classifications by education of the teacher. Therefore only tentatively is it possible to regard education as a variable related to verbal interaction.

With the exception of category 2, all categories seeming to account for considerable variance were identified with respect to previous hypotheses. The differences appeared to show a progression for categories 2, 8, and 13. Teachers with the least education apparently gave and discussed directions more than did the other groups and teachers with the most education gave and discussed directions less (category 2); pupils initiated talk most to teachers with the greatest amount of education and least to those with the least education (category 8); and "other activities" were observed most frequently for teachers with the least education and least frequently for teachers with the most education (category 13).

When related to age, experience, and sex of teachers in the three education groups (Table III, p. 31), these findings indicate that the classrooms ranking highest on teacher-given directions and on "other activities" tended



to be those taught by the youngest teachers, by teachers with the least experience, and by teachers who were predominantly female. Similarly, those whose observations included the greatest proportion of pupil-initiated talk to the teacher tended to be the ones taught by the oldest teachers, by teachers with the most experience, and by teachers who were predominantly male.

### Experience of Teacher

Hypothesis 1.4: There is a significant relationship between various aspects of verbal interaction and the experience of the teacher.

Findings. The analysis of observations for the entire sample and for medium groups classified by experience of the teacher revealed significant differences for each of the five criteria of verbal interaction, as reported in Table XVI. Without exception, these differences were significant at the 0.001 level of confidence.

When ranked by category totals, the categories of verbal interaction which seemed to account for the greatest variance among the experience groups were 8, 1, and 13 (Table XVII). Category 8 (Pupil initiates talk to teacher) ranked highest in classrooms taught by teachers with the most experience and lowest in those taught by teachers with the least experience. Category 1 (Teacher presents information or opinion) ranked lowest for teachers with the least experience and highest for teachers in the middle experience group. Category 13 (Other activities) ranked





TABLE XVI

ANALYSIS OF OBSERVATIONS FOR THE ENTIRE SAMPLE AND FOR  
MEDIUM GROUPS CLASSIFIED BY EXPERIENCE OF TEACHER

Criterion	Entire Sample			Medium Groups		
	$\chi^2$	df	Signif- icance	$\chi^2$	df	Signif- icance
Group Matrices	696	312	0.001	652	312	0.001
Category Totals	789	24	0.001	823	24	0.001
Steady States	683	24	0.001	696	24	0.001
Uninterrupted Talk	32.7	2	0.001	59.3	2	0.001
Total Talk	20.4	2	0.001	36.4	2	0.001



TABLE XVII

PROPORTIONS AND RANKS OF INTERACTION ANALYSIS CATEGORY  
 TOTALS CLASSIFIED BY EXPERIENCE OF TEACHER  
 AND FOR THE ENTIRE SAMPLE

Cate- gory <sup>a</sup>	1-2 Years		3-7 Years		8 or more Years		Entire Sample	
	%	Rank	%	Rank	%	Rank	%	Rank
1	14.9	3	23.6	1	17.2	3	18.6	3
2	7.2	6	5.6	7	5.5	7	6.2	6
3	9.3	5	7.1	5	7.5	6	8.0	5
4	5.4	7	4.3	8	3.9	8	4.6	8
5	3.5	9	1.9	10	2.6	9.5	2.7	9
6	12.0	4	10.5	4	8.8	4	10.6	4
7	0.1	11.5	0.2	13	0.7	12	0.3	12
8	4.5	8	6.4	6	7.6	5	6.1	7
9	0.1	11.5	0.5	12	1.1	11	0.5	11
10	17.8	2	22.0	2	20.2	2	20.0	1
11	0.0	13	0.6	11	0.2	13	0.2	13
12	3.2	10	2.1	9	2.6	9.5	2.6	10
13	22.0	1	15.1	3	22.2	1	10.7	2

<sup>a</sup>See Appendix B for description of categories



lower for teachers with average experience than for those in the other experience groups.

Discussion. The research hypothesis was wholly supported by the findings, since all differences tested were sufficient to reject the null hypothesis at the 0.001 level of confidence. However, as was the case for age and for education of the teacher, Hypotheses 1.1 and 1.3 respectively, it was not feasible, due to the limited sample size, to undertake additional analyses by experience of the teacher within other classifications. Therefore, only tentatively is it possible to regard experience as a variable related to verbal interaction.

Of the three categories, 1, 8, and 13, category 3 was the only one whose rankings showed a progression across the three experience groups. This category ranked lowest in classrooms of teachers with the least experience, as it did for classrooms of the youngest teachers and for classrooms of teachers with the least education. It ranked highest for teachers with the most experience, as it did for those with the most education. Since age, education, and experience were related for this sample, the trend would appear to be that classrooms with the greatest proportion of pupil-initiated talk directed to the teacher are those whose teachers are the oldest and have the most education and experience.

Category 1 also, as was the case for the youngest





teachers and for those with the least education, ranked lowest for those with the least experience. Although the proportions for this category were not progressive across the three classifications of age, education, and experience, it does appear to be noteworthy that the youngest, least educated, and least experienced teachers were associated consistently with the lowest proportion of teacher-presented information or opinion. Again, it may be pointed out that this may indicate a trend, in view of the relatedness of age, education, and experience for this sample.

The relative ranking of category 13 among the three experience groups does not appear to have any significance, particularly since no relationship to the relative rankings of this category is evident either among the three age groups or among the three education groups.

### Summary

All analyses of observations for the entire sample, classified by age, by sex, by education, and by experience, revealed significant differences, mostly at the 0.001 level of confidence. Similar results were obtained for additional analyses of observations for medium groups only, based upon the same classifications.

When classified by sex of teacher, additional analyses of observations for the two types of instructional organization, the three subjects, and the three sizes of instructional group revealed some possible sources of



differences. The significant differences revealed by analyses of observations for the entire sample and for medium groups did not hold consistently for all other analyses. These findings suggest the possibility that instructional organization, subject, and group size are also important variables related to verbal interaction.

## II. GRADE

Hypothesis 2 : There is a significant relationship between various aspects of verbal interaction and the grade being taught.

Findings. The sample included one classroom in the conventional school which was classified officially as Grades V-VI. In order to determine whether the verbal interaction in this classroom differed noticeably from that of other grades, the analyses included both a separate classification for this grade designation and a treatment of this classroom as part of Grade VI. For example, for the criterion of group matrices, the analysis of observations for the conventional school, classified by grade, resulted in a chi square value of 13.76 when based on a four-grade classification and a chi square value of 12.49 when based on a three-grade classification. Both results showed differences significant at the 0.001 level of confidence. Since the results of both treatments regarding the Grade V-VI observations yielded identical levels of significance for all analyses, the chi square values that appear in the tables that follow are based upon a three-grade





classification for both schools, with the above-mentioned classroom being classified with the Grade VI group.

The analysis of observations for the entire sample classified by grade being taught revealed differences, significant at the 0.001 level of confidence, for each of the five criteria of verbal interaction, as shown in Table XVIII. However, these differences did not hold completely when the observations for the three sizes of group were analysed separately, as reported in Table XIX. Only for medium groups did all criteria reveal significant differences. For both large groups and small groups, no significant differences were revealed for the criteria of group matrices, uninterrupted talk, and total talk.

The rank ordering of category totals, as evident from the data presented in Table XX, shows that categories 8 and 10 appear to account for the greatest variance among the three grade groups. Observations for Grade VI contained the highest proportion and observations for Grade IV contained the lowest proportion of pupil-initiated talk to the teacher (category 8). The proportion of "Private talk between teacher and pupil" (category 10) was considerably higher for Grade V than for the other grades.

Category 2 (Teacher gives or discusses directions), although revealing no great difference in ranking, did reveal substantial differences in proportion of observations and a progression in tally frequencies for the three





TABLE XVIII

ANALYSIS OF OBSERVATIONS FOR THE ENTIRE SAMPLE  
CLASSIFIED BY GRADE

Criterion	Grade		
	$\chi^2$	df	Significance
Group Matrices	665	312	0.001
Category Totals	701	24	0.001
Steady States	518	24	0.001
Uninterrupted Talk	56.8	2	0.001
Total Talk	40.4	2	0.001



TABLE XIX

ANALYSIS OF OBSERVATIONS FOR LARGE GROUPS, FOR MEDIUM GROUPS,  
AND FOR SMALL GROUPS CLASSIFIED BY GRADE

Criterion	Large Groups			Medium Groups			Small Groups		
	X <sup>2</sup>	df	Signif- icance	X <sup>2</sup>	df	Signif- icance	X <sup>2</sup>	df	Signif- icance
Group Matrices	333	312	N.S.	664	312	0.001	330	312	N.S.
Category Totals	237	24	0.001	897	24	0.001	382	24	0.001
Steady States	214	24	0.001	660	24	0.001	324	24	0.001
Uninterrupted Talk	4.5	2	N.S.	106	2	0.001	4.5	2	N.S.
Total Talk	1.7	2	N.S.	71.4	2	0.001	1.3	2	N.S.



TABLE XX

PROPORTIONS AND RANKS OF INTERACTION ANALYSIS CATEGORY  
TOTALS CLASSIFIED BY GRADE AND FOR THE ENTIRE SAMPLE

Cate- gory <sup>a</sup>	Grade IV		Grade V		Grade VI		Entire Sample	
	%	Rank	%	Rank	%	Rank	%	Rank
1	18.7	2	17.4	3	19.4	1.5	18.6	3
2	8.4	6	5.4	7	4.9	7	6.2	6
3	9.2	5	6.1	5	8.3	5	8.0	5
4	5.5	7	3.4	8	4.6	8	4.6	8
5	3.3	9	2.6	9	2.2	10	2.7	9
6	12.5	4	7.7	4	10.8	4	10.6	4
7	0.1	12.5	0.3	13	0.5	12	0.3	12
8	4.8	8	5.8	6	7.3	6	6.1	7
9	0.1	12.5	0.4	11.5	0.9	11	0.5	11
10	15.3	3	26.7	1	19.4	1.5	20.0	1
11	0.2	11	0.4	11.5	0.2	13	0.2	13
12	3.0	10	2.2	10	2.6	9	2.6	10
13	18.8	1	21.8	2	19.0	3	19.7	2

<sup>a</sup>See Appendix B for description of categories





grades; the highest proportion of observations was recorded for Grade IV and the lowest for Grade VI.

In Grade VI, very nearly the same proportions of observations were recorded for categories 1, 10, and 13, whereas the relative proportions for the other grades, particularly Grade V, were quite different.

Discussion. The research hypothesis was wholly supported by the findings for the entire sample and for medium groups. Therefore, the null hypothesis was rejected with respect to these analyses.

The null hypothesis was accepted for observations of both large groups and small groups with reference to three of the five criteria. However, in view of the small numbers of teachers involved in the teaching of both large and small groups as compared with the number teaching medium groups, this conclusion is one which can be considered valid only temporarily.

It would appear that the grade being taught may be considered to be a variable related to verbal interaction, as is suggested by findings of Furst and Amidon which are reported in the review of the literature (supra, p. 16). Furst and Amidon found, in part, that the percentages of teacher talk and student talk varied noticeably among grades.

Whether or not this finding would hold for analyses of large groups and small groups where the number of interaction analysis observations and the sample size were



larger than in the present study is not clear. Certainly for the present sample it seems that in comparisons of verbal interaction among the grades, consideration must be given to group size as a possible correlate, or related predictor of verbal interaction.

The findings regarding categories 2 and 8 indicate two interesting progressions in that the lower the grade, the more the teacher "gives or discusses directions" and the higher the grade, the more the pupil-initiated talk to the teacher. The lowest grade also included the lowest proportion of "private talk between teacher and pupil". To add to the significance of these differences, it will be noted that "total teacher talk" (categories 1 to 5) accounts for 45.1% of the interaction analysis tallies in Grade IV and considerably less for the other grades. This discrepancy appears to be due largely to the greater amounts of direction-giving and questioning that occur in the Grade IV classrooms.

### III. SUBJECT MATTER

Hypothesis 3 : There is a significant relationship between various aspects of verbal interaction and the subject matter being taught.

Findings. The analysis of observations for the entire sample revealed differences which were significant at the 0.001 level of confidence for all criteria under study, as is shown in Table XXI. This table and Table XXII report the findings of additional analyses for each of the



TABLE XXI

ANALYSIS OF OBSERVATIONS FOR THE ENTIRE SAMPLE, FOR THE CONVENTIONAL SCHOOL,  
AND FOR THE TEAM TEACHING SCHOOL CLASSIFIED BY SUBJECT

Criterion	Entire Sample		Conventional School		Team Teaching School	
	$\chi^2$	df	Signif- icance	$\chi^2$	df	Signif- icance
Group Matrices	724	312	0.001	701	312	0.001
Category Totals	1087	24	0.001	1578	24	0.001
Steady States	952	24	0.001	1172	24	0.001
Uninterrupted Talk	104	2	0.001	120	2	0.001
Total Talk	45.9	2	0.001	100	2	0.001





TABLE XXII

ANALYSIS OF OBSERVATIONS FOR MEDIUM GROUPS AND FOR  
SMALL GROUPS CLASSIFIED BY SUBJECT<sup>a</sup>

Criterion	Medium Groups			Small Groups <sup>b</sup>		
	X <sup>2</sup>	df	Signif- icance	X <sup>2</sup>	df	Signif- icance
Group Matrices	626	312	0.001	177	156	N.S.
Category Totals	1159	24	0.001	405	12	0.001
Steady States	818	24	0.001	356	12	0.001
Uninterrupted Talk	117	2	0.001	31.6	1	0.001
Total Talk	110	2	0.001	21.2	1	0.001

<sup>a</sup>No analysis was done for Large Groups classified by Subject, since insufficient observations were made of large group instruction in Reading and Mathematics.

<sup>b</sup>Reading and Mathematics only; insufficient observations were made of small group instruction in Social Studies.



two schools and for each of two sizes of group separately. Significant differences were also found at the same level of confidence for the additional analyses with one exception. The comparison for small group observations between the total matrices for Reading and for Mathematics (the only subjects with sufficient observations to permit analysis) showed no significant differences between the total interaction patterns (group matrices) of the two subjects.

The rankings of the total interaction analysis tallies for category 8 (Pupil initiates talk to teacher) and, to a lesser extent, category 13 (Other activities) varied noticeably among the three subjects (Table XXIII). For Social Studies, category 8 ranked fourth and for Mathematics it ranked eighth. The proportion for category 13 was highest for Reading and lowest for Mathematics, and the proportion for Mathematics was only half of that for Social Studies. The greatest difference in proportions occurred for category 10 (Private talk between teacher and pupil).

Discussion. The research hypothesis was wholly supported by the findings of analyses of observations for the entire sample, for the conventional school, for the team teaching school, and for medium groups. It was largely supported by the findings when only small group observations were included in the analysis.

These findings seem to indicate that subject taught



TABLE XXIII

PROPORTIONS AND RANKS OF INTERACTION ANALYSIS CATEGORY  
TOTALS CLASSIFIED BY SUBJECT AND FOR THE ENTIRE SAMPLE

Cate- gory <sup>a</sup>	Reading		Mathe- matics		Social Studies		Entire Sample	
	%	Rank	%	Rank	%	Rank	%	Rank
1	17.4	2	16.9	2	21.3	2	18.6	3
2	7.4	6	5.7	6	5.5	7	6.2	6
3	8.2	5	9.8	5	6.3	6	8.0	5
4	5.3	8	5.3	7	3.3	8	4.6	8
5	2.2	10	4.0	9	1.9	10	2.7	9
6	13.6	4	10.7	4	7.7	5	10.6	4
7	0.1	13	0.1	11.5	0.6	12	0.3	12
8	5.7	7	4.1	8	8.2	4	6.1	7
9	0.2	12	0.1	11.5	1.2	11	0.5	11
10	13.9	3	24.8	1	21.4	1	20.0	1
11	0.4	11	0.0	13	0.4	13	0.2	13
12	2.6	9	3.0	10	2.3	9	2.6	10
13	23.1	1	15.6	3	20.1	3	19.7	2

<sup>a</sup>See Appendix B for description of categories





bears a relationship to verbal interaction patterns. That is, one might on the basis of these data predict differing patterns of verbal interaction for different subjects. However, as was found with respect to Hypothesis 2 in comparisons of verbal interaction among the grades, for the present sample it seems that in comparisons of verbal interaction among the subjects, consideration must be given to group size as a possible correlate, or related predictor of verbal interaction. Had there been sufficient observations for large groups and small groups in all subjects, the findings may have more definitely indicated such a relationship.

The fact that there were insufficient observations to carry this analysis further is in itself very interesting. Table XXXVIII in Appendix E reveals considerable imbalance in the number of interaction analysis tallies included in the various combinations of subject and group size. It appears from these figures that teachers do not consider either large groups to be very appropriate for Reading and Mathematics or small groups to be very appropriate for Social Studies.

Another apparent attitude of teachers, or perhaps simply a style of teaching, is reflected in the fact that the proportion of pupil-initiated talk is much greater in Social Studies than in the other subjects. The nature of the subject matter, of course, probably also accounts for



some of this difference. The marked differences in proportions for categories 10 and 13 might at least partly be explained in terms of subject matter differences. It would appear from the evidence in the present study that the subject matter has an influence on many aspects of verbal interaction. This fact was reported by Furst and Amidon, who found that the percentage of teacher talk, the percentage of student talk, and the percentage in individual categories varied noticeably among the subjects being taught (supra, p. 16).

#### IV. GROUP SIZE

Hypothesis 4 : There is a significant relationship between various aspects of verbal interaction and the size of the group being taught.

Findings. The analysis of observations for the entire sample revealed differences, significant at the 0.001 level of confidence, for all criteria under study. These findings are reported in Table XXIV, which also contains the results of separate analyses of observations for each school. The differences among the group sizes were significant for the team teaching school, but were not significant, for the criteria of group matrices, uninterrupted talk, and total talk, for the conventional school.

Table XXV reports the same findings for Mathematics as were reported for the conventional school, while the differences were significant for all five criteria when separate analyses were performed for Reading and for Social Studies.



TABLE XXIV

ANALYSIS OF OBSERVATIONS FOR THE ENTIRE SAMPLE, FOR THE CONVENTIONAL SCHOOL,  
AND FOR THE TEAM TEACHING SCHOOL CLASSIFIED BY GROUP SIZE

Criterion	Entire Sample		Conventional School <sup>a</sup>		Team Teaching School	
	$\chi^2$	df	$\chi^2$	df	$\chi^2$	df
Group Matrices	699	312	190	156	571	312
Category Totals	1736	24	189	12	1267	24
Steady States	1713	24	131	12	1248	24
Uninterrupted Talk	40.4	2	0.2	1	11.8	2
Total Talk	94.2	2	0.1	1	29.0	2

<sup>a</sup>Medium and Small Groups only; insufficient observations were made of large group instruction in the conventional school.





TABLE XXV

ANALYSIS OF OBSERVATIONS FOR READING, FOR MATHEMATICS, AND FOR  
SOCIAL STUDIES CLASSIFIED BY GROUP SIZE

Criterion	Reading <sup>a</sup>		Mathematics <sup>a</sup>		Social Studies <sup>b</sup>	
	$\chi^2$	df	Signif- icance	$\chi^2$	df	Signif- icance
Group Matrices	214	156	0.01	160	156	N.S.
Category Totals	130	12	0.001	164	12	0.001
Steady States	105	12	0.001	106	12	0.001
Uninterrupted Talk	9.5	1	0.01	1.3	1	N.S.
Total Talk	7.8	1	0.01	1.5	1	N.S.

<sup>a</sup>Medium and Small Groups only; insufficient observations were made of large group instruction in Reading and Mathematics.

<sup>b</sup>Large and Medium Groups only; insufficient observations were made of small group instruction in Social Studies.



The categories whose ranks varied by two or more among the three classifications of group size were 10 (Private talk between teacher and pupil), 8 (Pupil initiates talk to teacher), 1 (Teacher presents information or opinion), and 4 (Teacher accepts idea, behavior, feeling of pupil) (Table XXVI). Progressive differences between groups occurred for categories 6 (Pupil responds to teacher), 8, and 13 (Other activities).

Discussion. The research hypothesis that there is a relationship between verbal interaction and group size was wholly supported by the findings of analyses involving the entire sample, the team teaching school, reading, and Social Studies. The null hypothesis was largely supported by the findings of analyses involving the conventional school and Mathematics.

These results suggest that group size quite likely is a variable related to verbal interaction and also that, as was the case with respect to Hypotheses 2 and 3, there are other closely related variables which must be considered. In this case, the subject being taught appears to be a related variable. Whether type of school, that is, type of instructional organization, is also a related variable is perhaps not definite, in view of the fact that only two sizes of group were being compared for the conventional school, there being insufficient observations to include large groups in the analyses. The findings merely indicate



TABLE XXVI

PROPORTIONS AND RANKS OF INTERACTION ANALYSIS CATEGORY  
TOTALS CLASSIFIED BY GROUP SIZE  
AND FOR THE ENTIRE SAMPLE

Category <sup>a</sup>	Large Groups		Medium Groups		Small Groups		Entire Sample	
	%	Rank	%	Rank	%	Rank	%	Rank
1	41.7	1	15.3	3	15.6	3	18.6	3
2	6.1	6	6.3	6	5.5	7	6.2	6
3	8.4	4	7.8	5	8.7	5	8.0	5
4	4.3	7.5	4.4	8	5.9	6	4.6	8
5	2.6	9	2.8	9.5	1.9	10	2.7	9
6	9.7	3	10.3	4	13.0	4	10.6	4
7	0.3	13	0.4	12	0.0	12.5	0.3	12
8	7.6	5	5.9	7	5.4	8	6.1	7
9	0.5	12	0.6	11	0.2	11	0.5	11
10	4.3	7.5	22.8	1	18.3	2	20.0	1
11	0.8	11	0.2	13	0.0	12.5	0.2	13
12	2.2	10	2.8	9.5	2.2	9	2.6	10
13	11.5	2	20.1	2	23.3	1	19.7	2

<sup>a</sup>See Appendix B for description of categories





that in the conventional school there were no significant differences for three of the five criteria, medium and small groups only being compared.

The findings with respect to Mathematics, however, do seem to be noteworthy. For this group of observations, no significant differences were revealed among the three sizes of group for the criteria of group matrices, uninterrupted talk, and total talk.

The rank ordering of category totals for small, medium, and large groups (Table XXVI) reveals that the ranking for category 10 (Private talk between teacher and pupil) varied much more among the three classifications by group size than did the ranking for any other category. This difference in rank of 6.5 between the highest and lowest rank (1 and 7.5 respectively) was greater than the difference in rank order within a category for any of the analyses undertaken to this point in the present study. Similarly, differences in proportion between classifications for category 1 (Teacher presents information or opinion) varied more than did differences in proportion for any category in the tables presented heretofore. Examining categories 1 and 10 in Table XXVI, we might surmise that large group instruction, at least for the sample studied, does not seem to encourage "private talk between teacher and pupil" (category 10) but, conversely, does seem to involve an unusually large proportion of teacher-initiated



presentation of information or opinion (category 1).

Neither of these two findings is surprising.

The differences pertaining to category 4 are perhaps significant in that there was somewhat more acceptance of pupils' ideas, behavior, and feelings in small groups than in either medium groups or large groups.

Differences for category 8 are also probably worth noting, since they reveal a progression in the proportions. The large groups account for the highest proportion and the highest ranking and small groups account for the lowest proportion and ranking within this category. This finding is surprising, since one might have expected the reverse to be the case--that is, the smaller groups being associated with the greatest proportion of pupil-initiated talk to the teacher.

Progression in the proportions was also noted for categories 6 and 13--the greatest proportions of both pupil responses to the teacher and "other activities" being associated with the small groups. The fact that Reading, as indicated in Table XXXVIII in Appendix E, accounted for the vast majority of small group observations partially explains these differences, since Reading classes often involved teacher questioning followed by pupil responding, oral reading by the pupil or teacher, silent reading, and seat-work. The last three of these activities are examples of activities which were recorded in category 13.





From all this evidence it appears reasonable to conclude that group size can be reliably regarded as a variable related to verbal interaction.

## V. INSTRUCTIONAL ORGANIZATION

Hypothesis 5 : There is a significant relationship between various aspects of verbal interaction and the type of instructional organization.

Findings. The analysis of observations for the entire sample revealed significant differences at the 0.001 level of confidence for all five criteria tested. This analysis is reported in Table XXVII.

In the separate analyses of observations for each subject and each group size, the findings based on the analysis involving Reading, Social Studies, and medium groups yielded identical levels of significance to those for the entire sample; these findings are shown in Tables XXVIII and XXIX. However, the analyses of observations for Mathematics and for small groups differed greatly from the others in that no significant differences were revealed for the criteria of uninterrupted talk and total talk for either of these segments of the sample. For small groups, too, the differences between the schools was of much less significance for the group matrices criterion than it was for all other analyses pertaining to this hypothesis. Because of insufficient observations of large group instruction in the conventional school, no analysis was done for large groups classified by school.





TABLE XXVII

ANALYSIS OF OBSERVATIONS FOR THE ENTIRE SAMPLE  
CLASSIFIED BY SCHOOL

Criterion	$\chi^2$	df	Significance
Group Matrices	447	156	0.001
Category Totals	697	12	0.001
Steady States	680	12	0.001
Uninterrupted Talk	74.3	1	0.001
Total Talk	112	1	0.001



TABLE XXVIII

ANALYSIS OF OBSERVATIONS FOR READING, FOR MATHEMATICS, AND FOR  
SOCIAL STUDIES CLASSIFIED BY SCHOOL

Criterion	Reading		Mathematics		Social Studies	
	$\chi^2$	Signif- df icance	$\chi^2$	Signif- df icance	$\chi^2$	Signif- df icance
Group Matrices	276	156 0.001	281	156 0.001	382	156 0.001
Category Totals	534	12 0.001	262	12 0.001	1514	12 0.001
Steady States	497	12 0.001	183	12 0.001	1373	12 0.001
Uninterrupted Talk	20.8	1 0.001	0.7	1 N.S.	95.5	1 0.001
Total Talk	13.2	1 0.001	1.4	1 N.S.	183	1 0.001



TABLE XXIX

ANALYSIS OF OBSERVATIONS FOR MEDIUM GROUPS AND FOR  
SMALL GROUPS CLASSIFIED BY SCHOOL<sup>a</sup>

Criterion	Medium Groups			Small Groups		
	X <sup>2</sup>	df	Signif- icance	X <sup>2</sup>	df	Signif- icance
Group Matrices	321	156	0.001	202	156	0.05
Category Totals	381	12	0.001	307	12	0.001
Steady States	393	12	0.001	222	12	0.001
Uninterrupted Talk	40.1	1	0.001	0.3	1	N.S.
Total Talk	36.1	1	0.001	0.1	1	N.S.

<sup>a</sup>No analysis was done for Large Groups classified by school, since insufficient observations were made of large group instruction in the conventional school.





The rank ordering analysis revealed that the categories whose ranked proportions differed by two or more between the schools were category 1 (Teacher presents information or opinion) and category 13 (Other activities). These data are shown in Table XXX.

Discussion. The research hypothesis was wholly supported by the findings of analyses involving the entire sample, Reading, Social Studies, and medium groups; it was only partially supported by the analyses involving Mathematics and small groups.

These results suggest that the type of instructional organization likely is a variable related to verbal interaction, at least for the present study, and that, as was the case with respect to Hypotheses 2, 3, and 4, other variables probably also must be considered to be related to school type. The subject being taught appears to be one of the related variables, since the analysis of Mathematics observations revealed no significant differences for several of the criteria. Similarly, the size of group being taught appears to be a related variable, since the analysis of small group observations revealed no significant differences for several of the criteria.

The differences between the schools in proportions of verbal interaction observations for categories 1 and 13 are quite considerable--11.4% and 7.1% respectively. The higher proportion for category 1 in the team teaching



TABLE XXX

PROPORTIONS AND RANKS OF INTERACTION ANALYSIS CATEGORY  
TOTALS CLASSIFIED BY SCHOOL AND FOR THE ENTIRE SAMPLE

Category <sup>a</sup>	Conventional School		Team Teaching School		Entire Sample	
	%	Rank	%	Rank	%	Rank
1	14.4	3	25.8	1	18.6	3
2	6.5	6	5.6	7	6.2	6
3	8.1	5	7.9	5	8.0	5
4	4.9	8	4.0	8	4.6	8
5	2.9	9	2.2	10	2.7	9
6	11.4	4	9.2	4	10.6	4
7	0.4	12	0.2	13	0.3	12
8	6.3	7	5.7	6	6.1	7
9	0.6	11	0.3	12	0.5	11
10	19.3	2	21.2	2	20.0	1
11	0.1	13	0.5	11	0.2	13
12	2.8	10	2.3	9	2.6	10
13	22.3	1	15.2	3	19.7	2

<sup>a</sup>See Appendix B for description of categories



school is associated with the fact that virtually all observations of large groups occurred in that school and that for the large groups, 41.7% of the interaction analysis tallies fell in that category (Table XXVI, p. 90). As was mentioned earlier, it is not surprising to find more teacher-initiated presentation of information or opinion in large groups. Hence, since there was more large group activity in the team teaching school, it is similarly not surprising to find more teacher-initiated presentation of information or opinion in the team teaching school.

The marked similarity in findings for the team teaching school and for large groups possibly is due to the above-mentioned fact that most observations of large groups were made in the one school. This imbalance is seen in Table XXXV in Appendix E. Conversely, although this fact does not seem to explain the findings, there was also a considerable imbalance between the schools for observations of small groups and, to a lesser extent, for medium groups. This record is in accordance with various claims and reports pertaining to group size and instructional organization, as reviewed earlier. For example, both Shaplin and Trump (supra, pp. 17-18) have referred to the facility for grouping which is provided by team teaching, and Wills has shown some of the advantages which grouping provides (supra, p. 19).

In view of the great variety of activities included





under category 13 (e.g., oral reading, silent reading, and seatwork), the proportions for this category may not in themselves be of great significance. However, the difference between the schools in that category, as seen from Table XXX, is of interest when viewed with the fact that "teacher talk" tallies (categories 1 to 5) comprise 36.8% of the conventional school observations as opposed to 45.5% of those for the team teaching school; the difference between these totals is approximately equal to the difference between the schools for category 13. This difference is also described in terms of the total time during which teachers were involved in verbal interaction (categories 1 to 12), namely, 77.7% in the conventional school compared to 84.8% in the team teaching school. It seems from these comparisons that teachers in the conventional school are somewhat more inclined toward supervising "other activities" and less inclined toward on-going verbal interaction than are teachers in the team teaching school.

The findings cited and discussed herein suggest that school type probably bears some relationship to verbal interaction. This conclusion supports various claims and reports regarding team teaching, as reviewed in Chapter II. Perhaps the most notable of these statements was provided by Wills, who pointed out that the team teaching school provides more opportunity for actual instruction and imposes less seatwork on the pupils than does the conventional



school of self-contained classrooms (supra, p. 19).

## VI. SUMMARY AND CONCLUSIONS

This chapter has described the sample and has reported and discussed the analysis of the data with reference to the following variables and their relationship to verbal interaction: characteristics of teachers; grade, subject, group size, and instructional organization.

For the most part, the analyses undertaken supported the research hypothesis that there is a relationship between various aspects of verbal interaction and the variables being studied. This relationship was particularly evident in the findings of analyses of observations for the entire sample and for medium groups, which segment of the sample was large enough to enable additional analyses to be made with reference to all hypotheses.

Other additional analyses were made whenever the number of teachers represented was sufficient to make analysis meaningful. Of the segments of the sample included in these analyses, the Social Studies segment was the only one, in addition to the medium groups segment, which consistently revealed significant differences among the categories into which the data were classified. The segments of the sample which appeared most often to support the null hypothesis were the observations of small groups and of Mathematics.

These additional analyses suggest a probable





interrelationship among the variables included in the study. This conclusion is drawn from the fact that some analyses of segments of the sample resulted in findings which were different from those for the entire sample. Of all the variables studied, group size and school subject seem to have been the ones most frequently associated with findings that were different from those pertaining to the entire sample.

The relationship of type of instructional organization to verbal interaction was seen most noticeably in the findings of Hypothesis 5. For all aspects of verbal interaction under study, there were significant differences between the classrooms of the two schools (Table XXVII, p. 94). In the analysis of observations for each subject separately when observations were classified by school (Table XXVIII, p. 95), significant differences between the classrooms of the two schools were found for all subjects, the only exceptions being for the uninterrupted talk and total talk criteria for the Mathematics segment of the sample. Similarly, in the analysis of observations for each group size separately classified by school (Table XXIX, p. 96), significant differences between the classrooms of the two schools were found for both medium groups and small groups, the only exceptions being for the uninterrupted talk and total talk criteria for the small groups segment of the sample.





In addition, the relationship of type of instructional organization to verbal interaction was seen in the analysis of observations for each school separately classified by sex of teacher (Table X, p. 58). In these analyses, it was seen that for most criteria the results were practically identical for both schools, but for the total talk criterion, only in the conventional classrooms were there significant differences between the sexes; in the team teaching classrooms, there were no significant differences between males and females in this aspect of verbal interaction.

Similarly, the relationship of type of instructional organization to verbal interaction was seen in the analysis of observations for each school separately classified by group size (Table XXIV, p. 87). In these analyses, it was seen that for the category totals and steady state cells criteria, the results were the same for both schools, but for the group matrices, uninterrupted talk, and total talk criteria, only in the team teaching classrooms were there significant differences among the three sizes of group; in the conventional classrooms, there were no significant differences between the two sizes of group in these aspects of verbal interaction.

However, the analysis of observations for each school separately classified by subject (Table XXI, p. 81) yielded identical results for each school. In other words,



regardless of the type of instructional organization, it was found that there were significant differences among the three subjects for all aspects of verbal interaction under study. Nevertheless, in view of the findings pertaining to type of instructional organization which were summarized in the preceding paragraphs, it appears that there is a relationship between type of instructional organization and verbal interaction.

Attempts were made to determine which categories of verbal interaction accounted for the greatest variance among the groups into which each predictor was classified. A recapitulation of the ranks for each classification of the predictors is shown in Table XXXI. Categories 1, 8, 10, and 13 were the ones whose proportions and ranks varied most widely among the groups into which each predictor was classified.

The relationship between type of instructional organization and verbal interaction was also seen from Table XXX (supra, p. 98). There was a considerable difference between the classrooms of the two schools in the proportions of interaction analysis tallies in categories 1 and 13. Moreover, it was seen that the difference between the classrooms of the two schools in the proportions of interaction analysis tallies in category 13 was approximately equal to the difference between the schools in the "teacher talk" tallies (categories 1 to 5). From



TABLE XXXI

RANKS OF INTERACTION ANALYSIS CATEGORY TOTALS CLASSIFIED BY PREDICTOR AND FOR THE ENTIRE SAMPLE

Category <sup>a</sup>	Age (Years)			Sex		Education (Years)			Experience (Years)			Grade			Subject			Group Size			School		Entire Sample
	20-25	26-34	35-54	Male	Female	2-3	4	5-6	1-2	3-7	8 or more	IV	V	VI	Reading	Mathematics	Social Studies	Large	Medium	Small	Conventional	Team Teaching	
1	3	1	1	2	3	3	1	3	3	1	3	2	3	1.5	2	2	2	1	3	3	3	1	3
2	6	7	5	7	6	5	6	7	6	7	7	6	7	7	6	6	7	6	6	7	5	7	6
3	5	6	8	5	5	6	5	8	5	5	6	5	5	5	5	5	5	4	5	5	5	5	5
4	7	8	9	8	8	7	9	9.5	7	8	8	7	8	8	8	7	8	7.5	8	6	8	8	8
5	10	10	9	9	10	9	9	9	9	10	9.5	9	9	10	10	9	10	9	9.5	10	9	10	9
6	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	3	4	4	4	4	4
7	13	12	13	13	12	13	12.5	12	11.5	13	12	12.5	13	12	13	11.5	12	13	12	12.5	12	13	12
8	8	5	7	6	7	8	7	5	8	6	5	8	6	6	7	8	4	5	7	8	7	6	7
9	11.5	11	12	12	11	11.5	11	11	11.5	12	11	12.5	11.5	11	12	11.5	11	12	11	11	11	12	11
10	1	3	2	1	2	2	3	1	2	2	2	3	1	1.5	3	1	1	7.5	1	2	2	2	1
11	11.5	13	11	11	13	11.5	12.5	13	13	11	13	11	11.5	13	11	13	13	11	13	12.5	13	11	13
12	9	9	10	10	9	10	10	9.5	10	9	9.5	10	10	9	9	10	9	10	9.5	9	10	9	10
13	2	2	3	3	1	1	2	2	1	3	1	1	2	3	1	3	3	2	2	1	1	3	2

<sup>a</sup>See Appendix B for description of categories





these comparisons, it was concluded that teachers in the conventional classrooms are somewhat more inclined toward supervising "other activities" (category 13) and less inclined toward on-going verbal interaction than are teachers in the team teaching classrooms.



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## CHAPTER V

### SUMMARY, CONCLUSIONS, AND IMPLICATIONS

This chapter reviews the study. It includes a statement of the problem and the hypotheses and brief descriptions of the sample, the instrumentation, the methods of analysing the data, and the findings arising from the analysis of the data. The chapter also contains the major conclusions and accompanying implications pertaining to the problem and sub-problems.

#### The Problem

The central problem of the study was to determine whether there are differences in verbal interaction between conventional and team teaching classrooms. The related literature was reviewed and several sub-problems were formulated with reference to the variables which might be expected to bear a relationship to verbal interaction in the classroom: characteristics of teachers, grade, subject, group size, and instructional organization. Hypotheses were developed pertaining to these sub-problems; the hypotheses postulated a relationship between each variable and verbal interaction.

Hypothesis 1 tested the relationship between verbal interaction and selected personal and professional characteristics of teachers; four sub-hypotheses were included in





this analysis, each referring to one of the characteristics of age, sex, education, and experience of teacher.

Hypotheses 2 to 5 tested the relationship between verbal interaction and the following variables: grade, subject, and group size being taught, and type of instructional organization.

### The Sample

The sample consisted of the teachers and pupils in Division II of two elementary schools in Edmonton--one school of each of the two types of instructional organization being studied. The conventional school was slightly larger than the team teaching school, there being eleven teachers in ten classrooms of Grades IV, V, and VI in the conventional school as compared to seven teachers in the three grades in the team teaching school.

The two schools differed somewhat. The conventional school was staffed with teachers whose average age was lower; it also had a lower percentage of male teachers than did the team teaching school. The conventional school also had a higher proportion of the teachers with few years of post-secondary education and few years of experience.

Other differences within the sample were evident when teachers were classified by age, sex, education, and experience. Notable among these were that there were a majority of males in the youngest age group and a minority in the oldest group; males had a higher average education



and a higher average experience than females; teachers with more education, as might be expected, were older and had more experience than did those in the other education groups; and there were a minority of males in the group having the least education and a majority in the group having the most education.

### Instrumentation

The technique for observing and recording verbal interaction in the classroom was based upon Flanders' system of verbal interaction analysis. Two observers were used to assess and record events by classifying them into thirteen categories of verbal interaction. The records of classroom observation were converted into matrices. The individual cells, the column totals, and several combinations of cells of these matrices were used in the analysis of the data.

### Analysis of the Data

The primary analysis was statistical analysis for five criteria. The first of these five criteria involved calculation of Darwin's chi square, comparing the total interaction patterns of two or more interaction analysis matrices. The other four involved calculation of chi squares comparing the observed and expected distributions of frequencies between or among selected groups of observations for the following aspects of verbal interaction:





category totals, steady state cells, uninterrupted talk, and total talk.

The primary analysis with respect to each hypothesis included all observations for the entire sample. However, wherever it appeared to be meaningful, additional analyses were made to determine whether differences found for the entire sample would also hold for segments of the sample, such as observations for a particular school or subject only.

A rank order analysis of category totals was made in order to ascertain which categories of verbal interaction seemed to account for the greatest variance between or among the groups into which each variable was classified. This analysis involved calculating the proportion that each category total (or sum of interaction analysis tallies in the category) was of the total number of tallies. These proportions were then rank ordered and the differences between or among the groups noted.

## Results

It was hypothesized that the four personal and professional characteristics of teachers (namely, age, sex, education, and experience), the grade, the subject, and the group size being taught, and the type of instructional organization all were related to the five criteria of verbal interaction. Results of the tests for significant relationships between or among groups of observations are





given below under the heading of the hypotheses pertaining to these eight variables.

Age of teacher. Hypothesis 1.1, that there is a relationship between verbal interaction and the age of the teacher was wholly supported, as a result of both the analysis of observations for the entire sample and the analysis of observations for medium groups only. The analysis of proportions and ranks among the age groups indicated that categories 1, 8, and 10 accounted for the greatest variance. Closer analysis revealed that a smaller proportion of the observations involving teacher-presented information (category 1) and a greater proportion of the observations involving private talk between teachers and pupils (category 10) occurred in classrooms taught by the youngest teachers, as compared with those taught by teachers in the other age groups. In category 8, the highest proportion was found in classrooms taught by teachers in the medium age group, which fact reveals that as a group these teachers were associated more closely with pupil-initiated talk to the teachers than were either of the other age groups.

Sex of teacher. Hypothesis 1.2, that there is a relationship between verbal interaction and the sex of the teacher, was wholly supported only with respect to some of the analyses, including that involving the entire sample. Analyses of the observations for the team teaching school, for Reading, for large groups, and for small groups failed



to support the research hypothesis completely. The analysis of proportions and ranks in relation to this hypothesis revealed that categories 10 (Private talk between teacher and pupil) and 13 (Other activities) accounted for the greatest variance between the sexes. For this sample, males talked considerably more than did females--a fact revealed by the respective proportions of "total teacher talk" (categories 1 to 5), category 10, and category 13.

Education of teacher. Hypothesis 1.3, that there is a relationship between verbal interaction and the education of the teacher was wholly supported by the findings. Categories 1, 2, 8, 10, and 13 seemed to account for the greatest variance among the education groups. A progression was noted for the proportions in categories 2, 8, and 13, with teachers having the least education being associated more with giving directions and supervising "other activities" than were the other groups and with teachers having the most education being associated more with pupil-initiated talk to the teacher than were the other groups. Classrooms taught by the middle education group accounted for a considerably higher proportion of teacher-presented information or opinion (category 1) and a considerably lower proportion of "Private talk between teacher and pupil" (category 10) than did those taught by either of the other education groups.

Experience of teacher. Hypothesis 1.4, that there is a relationship between verbal interaction and the





experience of the teacher was wholly supported by the data in the present study. Categories 1, 2, 8, and 13 apparently accounted for the greatest variance among the experience groups, with the proportions for categories 2 and 8 revealing a progression of differences with increasing experience. The teachers with the least experience, as was the case for those with the least education, appeared to spend a greater proportion of their time giving or discussing directions (category 2); those with the most experience, as for those with the most education, were associated more with pupil-initiated talk to the teacher (category 8) than were the other experience groups. Classrooms taught by the middle experience group, as was the case for those taught by the middle age group and the middle education group, accounted for a much greater proportion of time in teacher-presented information or opinion (category 1) than did those taught by either of the other groups. Conversely, classrooms taught by the middle experience group accounted for a much lower proportion of time spent on "Other activities" (category 13) than did those taught by either of the other two experience groups.

Summary of hypothesis 1. Hypothesis 1, that there is a relationship between various aspects of verbal interaction and certain personal and professional characteristics of teachers, was wholly supported by the results of analyses of observations for the entire sample. Due to the small





number of teachers represented in the various age, education, and experience groups, the only additional analyses which were meaningful were those of observations of each subject, each group size, and each school when classified by sex of teacher. These analyses yielded a variety of results, the research hypothesis being supported with respect to the conventional school, to Mathematics, to Social Studies, and to medium groups.

In the comparison of proportions and ranks, categories 1, 8, and 10 seemed to account for the greatest variance among the various groups into which the variables of age, sex, education, and experience were classified. Noteworthy among the differences were the facts that the highest proportion of teacher-presented information or opinion (category 1) occurred in classrooms taught by the medium age, medium education, and medium experience groups of teachers and that the lowest proportions occurred in classrooms taught by the youngest teachers and those having the least education and experience. The lowest proportions of pupil-initiated talk to the teacher (category 8) also occurred in classrooms taught by the youngest teachers and those having the least education and experience. Also, the highest proportions of "Private talk between teacher and pupil" occurred in classrooms taught by the youngest teachers, classrooms taught by males, and classrooms taught by those having the most education.



Grade. A relationship between verbal interaction and the grade being taught was hypothesized in Hypothesis 2. This hypothesis was substantially supported by the findings of analyses involving the entire sample and medium groups. Analyses of the observations for large groups and for small groups partially supported the null hypothesis. Categories 2, 8, and 10 appear to have accounted for the greatest variance in the interaction analysis categories; the first two showed a progression from grade to grade. In the classrooms of Grade IV, there was the highest proportion of teacher-given directions (category 2) and in Grade VI, there was the lowest proportion; in the classrooms of Grade IV, there was the lowest proportion of pupil-initiated talk to the teacher (category 8) and in Grade VI, there was the highest proportion. For "Private talk between teacher and pupil" (category 10), the proportion in classrooms of Grade V was much higher than were those of the other two grades.

Subject matter. Hypothesis 3, that there is a relationship between verbal interaction and the subject being taught was substantially supported by the findings in that for all analyses except for the analysis of observations for small groups, significant differences were revealed. No analysis was done for large groups since there were insufficient observations of large group instruction in Reading and in Mathematics. Categories 8, 10, and





13 seemed to account for the greatest variance among the three subjects. The greatest proportion of pupil-initiated talk to the teacher (category 8) occurred in Social Studies classrooms, and the lowest proportion occurred in Mathematics classrooms. The greatest proportion of private talk with pupils (category 10) occurred in Mathematics classrooms, while the lowest proportion occurred in Reading classrooms. "Other activities" (category 13) occurred most in Reading, next highest in Social Studies, and least in Mathematics.

Group size. Hypothesis 4, that there is a relationship between verbal interaction and the size of the group being taught, was substantially supported by the findings in that for all analyses except for the analyses of observations for the conventional school and for Mathematics, significant differences were revealed. Categories 1, 6, 8, 10, and 13 seem to have contributed most to the differences that were found, with the differences for categories 6, 8, and 13 showing a progression related to size of group. Small groups were associated both with the greatest proportion of pupil response talk to the teacher (category 6) and of "Other activities" (category 13); large groups were associated with the greatest proportion of pupil-initiated talk to the teacher (category 8). The most extreme differences in ranking and in proportion in all rank order comparisons undertaken occurred for categories 1 and 10. Large group instruction included by far the





greatest proportion of teacher-presented information or opinion (category 1) and also by far the lowest proportion of private talk between teachers and pupils (category 10).

Instructional organization. Hypothesis 5 states that there is a relationship between verbal interaction and the type of instructional organization. The analyses of observations for the entire sample and for several segments of the sample supported the research hypothesis. However, when the observations for Mathematics and for small groups were analysed, the null hypothesis was partially supported. Categories 1 and 13 accounted for the greatest variance between the schools. In the team teaching classes observed, there was considerably more time spent on teacher-presented information or opinion (category 1) and considerably less on "Other activities" (category 13) than in the conventional school.

### Conclusions

This thesis has examined in detail, within the limitations and delimitations described, verbal interaction in the classrooms of a conventional and a team teaching school. Since only one school of each type of instructional organization and only a limited number of teachers have been included in the study, no generalizations of the findings are possible beyond those pertaining to the particular schools and teachers included in the sample.

One effect of this limitation is that certain



analyses which might have yielded interesting results could not be done either because of the few teachers which would have been represented by the data (as was the case for age of teacher, for example) or because the number of interaction analysis tallies for various groups was too small (for example, with respect to large group instruction in Reading and in Mathematics).

For this sample, however, it does appear that, in general, all variables selected bear a significant relationship to the aspects of verbal interaction examined in the analyses. This relationship was particularly noticeable in the analyses which included observations for the entire sample and observations for medium groups. For these, the research hypotheses were accepted throughout, almost invariably at the 0.001 level of confidence.

However, for several variables, the differences found were not always significant when the data were divided into segments of the sample (other than the medium groups segment) and analysed separately. While significant differences at the 0.001 level of confidence were invariably found for the category totals and steady state cells criteria, the findings were not as conclusive with respect to the other criteria. For example, no significant differences were found for some of these criteria (namely, group matrices, uninterrupted talk, and total talk) for all analyses of both the large groups and the small groups





segments of the sample, and no significant differences were found for some of these criteria for most analyses of the Mathematics segment of the sample. In such instances, the research hypotheses could be only partially accepted.

With respect to the differences revealed by comparisons between the two schools, it is interesting to consider the personal and professional characteristics of the teachers; these characteristics, namely, age, sex, education, and experience, did vary somewhat between the two schools. The conventional school was staffed with teachers whose average age was lower, with a lower percentage of male teachers, and with higher proportions of the teachers having few years of post-secondary education and teaching experience than was the team teaching school. In view of these differences, it did not seem possible to regard these personal and professional characteristics as particularly useful controls in the present study.

Of all the variables studied, group size appears to be the one that accounted for the greatest variance in the findings. This conclusion is based on the finding that for all analyses of observations of both the large groups and small groups segments of the sample, the results were notably different from those pertaining to the entire sample and to the medium groups segment.

Furthermore, with reference to the secondary analysis of proportions and ranks of interaction analysis





category totals, the most striking differences in both proportions and ranks occurred for the comparisons among the three classifications of group size. Large groups accounted for considerably more teacher-presented information or opinion (category 1), considerably less "private talk between teacher and pupil" (category 10), and considerably less time devoted to "other activities" (category 13) than did either medium groups or small groups.

The difference between schools in proportions of interaction analysis category totals was second only to the differences among the three sizes of group for category 1; also, the difference between schools in proportions for category 13, although approximately tied with the differences pertaining to several other variables, was second only to the differences among the three sizes of group. These similarities perhaps were partly due to the fact that there was some relationship between school and size of group in that by far the greatest proportion of large group observations occurred in the classrooms of the team teaching school and by far the greatest proportion of small group observations occurred in the classrooms of the conventional school. In any event, it appears significant that in classrooms of the team teaching school, as was the case in large groups, there occurred both the greatest proportion of teacher-presented information or opinion (category 1) and the smallest proportion of "other activities" (category 13). This finding supports the claim of



Wills that "Pupils spend more time having instruction than when they are in a self-contained classroom" (supra, p. 19).

Another finding that supports the literature is the fact that there was a greater variety in size of the instructional groups in the team teaching school than in the conventional school (Appendix E, Table XXXV). Among those who suggest that team teaching provides opportunities for grouping that are not available in conventional, self-contained classrooms are Shaplin, Trump, and Wills (supra, pp. 17-19). Since group size and instructional organization both seem to be related to various aspects of verbal interaction, it appears reasonable to conclude that verbal interaction is facilitated in team teaching classrooms.

### Implications

The findings of the present study suggest several implications for educational administration and for further research.

Comparisons between conventional and team teaching classrooms are desirable from the viewpoint of administrators who must make decisions regarding innumerable aspects of the educational programme. Included among these are construction of new facilities to accommodate the increasing student population and to replace obsolete facilities, renovation of existing facilities to facilitate desirable innovation, and recruitment, employment, training, and retention of teaching personnel who are both able and





prepared to utilize educational facilities and themselves to optimum advantage.

Essential to these areas of decision-making is information such as that provided by findings of the present study which compares verbal interaction in conventional and team teaching classrooms. Notable is the fact that the type of physical facilities provided by the team teaching school does result in a greater variety in size of instructional group than the type available in the conventional school (e.g., there was practically no large group instruction in the conventional school) and, secondly, that comparisons of verbal interaction between the two schools and among the three sizes of group show considerable differences (e.g., there was a higher proportion of time spent on teacher-presented information or opinion and, apparently, on continuous verbal interaction, in the team teaching school than in the conventional school).

These differences among the three sizes of group and between the classrooms of the two schools perhaps imply other, accompanying differences. For example, it seems likely that in the team teaching school, in view of the higher proportion of large group instruction, teachers spent more time observing others teach and/or they enjoyed more free time than did teachers in the conventional school. Another accompanying difference is that small group instruction did not occur nearly as frequently in the team teaching





school as in the conventional school. Administrators and teachers alike must be observant in order to detect the differences which accompany innovation and thereby to ensure that the effectiveness of the educational programme will not diminish.

The application of interaction analysis would appear to be one means whereby behavior of teachers and pupils in classrooms can be studied with a view to identifying desirable, productive teaching practices and learning situations. Teachers, for example, could benefit from the opportunity to reflect upon a lesson or other event recorded using this technique and would be able to consider such questions as whether any aspect of the lesson might have been improved upon and whether anything should be done, either immediately or in a subsequent lesson, to further the goals of the teaching that has transpired.

Some suggestions for further research related to this study are the following:

1. The relationship between various patterns of verbal interaction and effective teaching.
2. The question as to whether effective teaching in the conventional type of instructional organization can also be considered to be effective teaching in the team teaching type of instructional organization.
3. The identification and comparison of behavior patterns and attitudes of teachers in conventional and team teaching classrooms.



4. A replication of the present study in which the personal and professional characteristics of teachers and size of school are more adequately controlled.

5. A replication of the study involving several schools of each type of instructional organization.

With particular reference to the purpose of the present study, administrators could utilize knowledge about desirable and effective teaching behavior in many aspects of their responsibility. In order to provide pupils with the learning experiences that will be of optimum benefit to themselves and to society, administrators have the general responsibility of ensuring that the appropriate staff, equipment, and facilities are readily available. Additional research such as the above-mentioned would appear to be needed to assist administrators with these tasks and with their continuous attempts to improve instruction and to encourage harmonious, productive relationships among all educators and students under their jurisdiction.



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## APPENDIX A

### TEACHER'S QUESTIONNAIRE



## TEACHER'S QUESTIONNAIRE

Name \_\_\_\_\_ Age \_\_\_\_ Sex \_\_\_\_

Marital Status \_\_\_\_\_

Years of University and Professional Education \_\_\_\_\_

Where Education Obtained \_\_\_\_\_

Major Field of Specialization \_\_\_\_\_

Years of Teaching Experience (including present) \_\_\_\_\_

Years of Experience at Present School (including present) \_\_\_\_

Previous Teaching Experience:

grades taught in elementary school \_\_\_\_\_

subjects taught in high school \_\_\_\_\_

other \_\_\_\_\_

Years of Administrative Experience (including present) \_\_\_\_

Teaching Assignment:

Conventional School Staff Only:

grade \_\_\_\_\_ room \_\_\_\_\_

subjects taught to these pupils by other teachers \_\_\_\_\_

teaching assignments in other classrooms \_\_\_\_\_

Team Teaching School Staff Only:

subjects taught in Division II \_\_\_\_\_

teaching assignments in other classrooms \_\_\_\_\_





## APPENDIX B

### CATEGORIES USED IN THE STUDY



## CATEGORIES USED IN THE STUDY

## Categories 1 to 3 -- Teacher-initiated talk

1. Presents information or opinion
2. Gives or discusses directions
3. Asks question

## Categories 4 to 5 -- Teacher response talk

4. Accepts ideas, behavior, feeling of pupil
5. Rejects ideas, behavior, feeling of pupil

## Categories 6 to 7 -- Pupil response talk

6. Responds to teacher
7. Responds to another pupil

## Categories 8 to 9 -- Pupil-initiated talk

8. Initiates talk to teacher
9. Initiates talk to another pupil

## Miscellaneous Categories

10. Private talk between teacher and pupil
11. Teacher-to-teacher talk
12. Silence or confusion
13. Other activities



## APPENDIX C

RECORD OF OBSERVATION FORM COMPLETED FOR A  
TYPICAL FIVE-MINUTE OBSERVATION









## APPENDIX D

RECORD OF FIVE-MINUTE OBSERVATIONS AND  
TOTAL INTERACTION ANALYSIS TALLIES BY TEACHER



TABLE XXXII

RECORD OF FIVE-MINUTE OBSERVATIONS AND TOTAL  
INTERACTION ANALYSIS TALLIES BY TEACHER

Teacher Number	Number of observations	Number of Tallies
1	12	1396
2	14	1567
3	13	1522
4	13	1515
5	13	1425
6	12	1345
7	12	1326
8	12	1377
9	12	1332
10	13	1550
11	10	1204
12	12	1193
13	13	1460
14	12	1218
15	13	1506
16	14	1537
17	15	1666
18	6	520
Total	221	24659





APPENDIX E

TOTAL INTERACTION ANALYSIS TALLIES

CLASSIFIED BY COMBINATIONS OF SITUATIONAL PREDICTORS



TABLE XXXIII

TOTAL INTERACTION ANALYSIS TALLIES BY SCHOOL AND GRADE

	Conventional School	Team Teaching School	Total
Grade IV	5306	2752	8058
Grade V	2890	3598	6488
Grade VI	7363	2750	10113
Total	15559	9100	24659



TABLE XXXIV

TOTAL INTERACTION ANALYSIS TALLIES BY SCHOOL AND SUBJECT

	Conventional School	Team Teaching School	Total
Reading	4807	3328	8135
Mathematics	4626	3041	7667
Social Studies	6126	2731	8857
Total	15559	9100	24659





TABLE XXXV

TOTAL INTERACTION ANALYSIS TALLIES  
BY SCHOOL AND GROUP SIZE

	Conventional School	Team Teaching School	Total
Large Groups	121	2968	3089
Medium Groups	13088	5430	18518
Small Groups	2350	702	3052
Total	15559	9100	24659



TABLE XXXVI

TOTAL INTERACTION ANALYSIS TALLIES BY GRADE AND SUBJECT

	Grade IV	Grade V	Grade VI	Total
Reading	3099	2319	2717	8135
Mathematics	2972	2093	2602	7667
Social Studies	1987	2076	4794	8857
Total	8058	6488	10113	24659



TABLE XXXVII

TOTAL INTERACTION ANALYSIS TALLIES  
BY GRADE AND GROUP SIZE

	Grade IV	Grade V	Grade VI	Total
Large Groups	717	780	1592	3089
Medium Groups	6410	5005	7103	18518
Small Groups	931	703	1418	3052
Total	8058	6488	10113	24659





TABLE XXXVIII

TOTAL INTERACTION ANALYSIS TALLIES  
BY SUBJECT AND GROUP SIZE

	Reading	Mathematics	Social Studies	Total
Large Groups	213	345	2531	3089
Medium Groups	5969	6263	6286	18518
Small Groups	1953	1059	40	3052
Total	8135	7667	8857	24659



APPENDIX F

INTERACTION ANALYSIS CATEGORY TOTALS  
CLASSIFIED BY PREDICTOR



TABLE XXXIX

INTERACTION ANALYSIS CATEGORY TOTALS BY AGE  
AND BY SEX OF TEACHER

Category <sup>a</sup>	Age (Years)			Sex	
	20-25	26-34	35-54	Male	Female
1	1621	1923	1049	2521	2072
2	610	487	422	657	862
3	969	543	460	1033	939
4	586	314	232	576	556
5	265	177	214	337	319
6	1349	687	567	1131	1472
7	15	59	1	13	62
8	475	652	373	685	815
9	16	107	4	33	94
10	2140	1745	1038	2802	2121
11	22	24	15	43	18
12	309	186	150	319	326
13	1966	1852	1035	1953	2900
Total	10343	8756	5560	12103	12556

<sup>a</sup>See Appendix B for description of categories





TABLE XL

INTERACTION ANALYSIS CATEGORY TOTALS BY EDUCATION  
AND BY EXPERIENCE OF TEACHER

Category <sup>a</sup>	Education (Years)			Experience (Years)		
	2-3	4	5-6	1-2	3-7	8+
1	882	2018	1693	1325	2034	1234
2	476	492	551	640	485	394
3	452	828	692	824	613	535
4	281	443	408	483	371	278
5	153	239	264	312	161	183
6	654	1039	910	1062	908	633
7	2	12	61	7	19	49
8	269	454	777	404	551	545
9	3	22	102	10	41	76
10	1005	1287	2631	1579	1897	1447
11	7	12	42	0	49	12
12	150	227	268	280	181	184
13	1337	1737	1779	1959	1301	1593
Total	5671	8810	10178	8885	8611	7163

<sup>a</sup>See Appendix B for description of categories



TABLE XLI

## INTERACTION ANALYSIS CATEGORY TOTALS BY GRADE

Category <sup>a</sup>	Grade IV	Grade V	Grade VI
1	1508	1128	1957
2	677	349	493
3	739	393	840
4	445	221	466
5	269	166	221
6	1007	502	1094
7	7	19	49
8	386	374	740
9	9	23	95
10	1239	1730	1957
11	13	27	21
12	244	140	261
13	1518	1416	1919
Total	8058	6488	10113

<sup>a</sup>See Appendix B for description of categories



TABLE XLII

INTERACTION ANALYSIS CATEGORY TOTALS BY SUBJECT  
AND BY GROUP SIZE

Cate- gory <sup>a</sup>	Subject			Group Size		
	Reading	Mathe- matics	Social Studies	Large	Medium	Small
1	1416	1294	1883	1288	2828	477
2	598	435	486	187	1163	169
3	666	748	558	261	1447	264
4	429	410	293	132	821	179
5	182	304	170	80	519	57
6	1103	822	678	301	1906	396
7	9	9	57	9	65	1
8	465	313	722	234	1100	166
9	18	6	103	16	105	6
10	1128	1904	1891	134	4229	560
11	29	0	32	26	35	0
12	210	228	207	67	511	67
13	1882	1194	1777	354	3789	710
Total	8135	7667	8857	3089	18518	3052

<sup>a</sup>See Appendix B for description of categories





## APPENDIX G

EXAMPLES OF BASIC DATA USED FOR ANALYSES  
OF INTERACTION ANALYSIS DISTRIBUTIONS



TABLE XLIII

BASIC DATA FOR CHI SQUARE TEST OF INTERACTION ANALYSIS  
CATEGORY TOTAL DISTRIBUTIONS CLASSIFIED BY SCHOOL

Category <sup>a</sup>	Observed Frequencies		Expected Frequencies <sup>b</sup>			
	Conventional School	Team Teaching School	Total	Conventional School	Team Teaching School	Total
1	2242	2351	4593	2898	1695	4593
2	1012	507	1519	958	561	1519
3	1257	715	1972	1244	728	1972
4	764	368	1132	714	418	1132
5	457	199	656	414	242	656
6	1767	836	2603	1642	961	2603
7	56	19	75	47	28	75
8	981	519	1500	946	554	1500
9	101	26	127	80	47	127
10	2997	1926	4923	3106	1817	4923
11	12	49	61	38	23	61
12	439	206	645	407	238	645
13	3474	1379	4853	3062	1791	4853
Total	15559	9100	24659	15559	9100	24659
Chi square <sup>b</sup> = 697			df = 12	Probability beyond 0.001		

<sup>a</sup>See Appendix B for description of categories<sup>b</sup>Rounded to the nearest unit



TABLE XLIV

BASIC DATA FOR CHI SQUARE TEST OF INTERACTION ANALYSIS  
STEADY STATE CELL DISTRIBUTIONS CLASSIFIED BY SCHOOL

Category <sup>a</sup>	Observed Frequencies		Expected Frequencies <sup>b</sup>	
	Conventional School	Team Teaching School	Conventional School	Team Teaching School
1	1625	1904	2144	1385
2	589	287	532	344
3	275	193	284	184
4	19	5	15	9
5	130	36	101	65
6	684	303	600	387
7	28	7	21	14
8	239	201	267	173
9	52	8	36	24
10	2331	1648	2417	1562
11	8	36	27	17
12	101	30	80	51
13	2901	1146	2458	1589
Total	8982	5804	8982	5804
Chi square <sup>b</sup> = 680		df = 12	Probability beyond 0.001	

<sup>a</sup>See Appendix B for description of categories

<sup>b</sup>Rounded to the nearest unit





TABLE XLV

BASIC DATA FOR CHI SQUARE TEST OF INTERACTION ANALYSIS TOTAL UNINTERRUPTED  
TEACHER AND PUPIL TALK DISTRIBUTIONS CLASSIFIED BY SCHOOL

Unin- errupted Talk <sup>a</sup>	Observed Frequencies		Expected Frequencies <sup>b</sup>	
	Conventional School	Team Teaching School	Conventional School	Team Teaching School
		Total		Total
Teachers	3936	3274	4092	3118
		7210		7210
Pupils	1085	552	929	708
		1637		1637
Total	5021	3826	5021	3826
		8847		8847
Chi square = 74.3		df = 1	Probability beyond 0.001	

<sup>a</sup>See pages 8-9 for description

<sup>b</sup>Rounded to the nearest unit



TABLE XLVI

BASIC DATA FOR CHI SQUARE TEST OF INTERACTION ANALYSIS TOTAL  
TEACHER AND PUPIL TALK DISTRIBUTIONS CLASSIFIED BY SCHOOL

Total Talk <sup>a</sup>	Observed Frequencies			Expected Frequencies <sup>b</sup>		
	Conventional School	Team Teaching School	Total	Conventional School	Team Teaching School	Total
Teachers	5732	4140	9872	6014	3858	9872
Pupils	2905	1400	4305	2623	1682	4305
Total	8637	5540	14177	8637	5540	14177
Chi square <sup>b</sup> = 112			df = 1	Probability beyond 0.001		

<sup>a</sup>See page 9 for description

<sup>b</sup>Rounded to the nearest unit







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